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IS 4179 (1967): Sizes of process vessels and leading dimensions [MED 17: Chemical Engineering Plants and Related Equipment]



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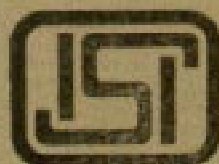
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# *Indian Standard*

## SIZES OF PROCESS VESSELS AND LEADING DIMENSIONS

(Fourth Reprint FEBRUARY 1984)

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**INDIAN STANDARDS INSTITUTION**  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

# Indian Standard

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# *Indian Standard*

## SIZES OF PROCESS VESSELS AND LEADING DIMENSIONS

### 0. FOREWORD

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 24 April 1967, after the draft finalized by the Chemical Engineering Sectional Committee had been approved by the Mechanical Engineering Division Council.

**0.2** Chemical and allied industries cover a wide range of operations and processes and consequently use varied categories of process vessels, such as tanks and reservoirs, pans and evaporators, stills and columns, reaction vessels and autoclaves, separators, mixers and crystallizers, and driers to suit individual requirements. Obviously it is not possible to lay down sizes for all categories of vessels as some of these call for special characteristics. But standardization of dimensions for the types in most common use will enable quicker selection, ease in design and fabrication and to a certain extent facilitate stocking.

**0.3** This standard recommends leading dimensions for certain categories of process vessels basing on nominal diameters already standardized (see IS : 2844-1964\*) and common proportions in respect of the leading dimensions and relating these to nominal capacities as far as possible (see IS : 2843-1964†). Non-preferred values of nominal diameters and nominal capacities are given within brackets.

**0.4** This standard covers dimension only, design and construction should comply with appropriate Indian Standard.

**0.5** Useful technical data on cylindrical shells, conical and formed ends and 'U' shaped shells are given in appendices A to J to enable working out the surface, cross-section, volume and weights.

**0.6** In the preparation of this standard considerable assistance has been derived from B.S. 3161 : 1960 'Sizes of process vessels for chemical and allied industries' issued by the British Standards Institution.

\*Recommendation on nominal diameters for process equipment.

†Recommendation on nominal capacities for process equipment.

## **1. SCOPE**

**1.1** This standard specifies leading dimensions of process vessels in predominant usage in the chemical and allied industries (*see* Tables 1 to 22).

## **2. CAPACITY**

**2.1** The calculated capacity in the tables is in all cases the full volume of the vessel, and each vessel has been rated at the next lower nominal capacity in IS : 2843-1964\*.

## **3. SHAPE AND PROPERTIES**

**3.1** The shape of a vessel is dictated by the technical requirements. But the majority of the process vessels are cylindrical in shape with flat, or conical or dished ends (*see also* IS : 4049-1971†) of one of the categories, such as hemispherical, semiellipsoidal or torispherical.

**3.1.1** Flat or shallow conical end vessels are generally used for non-pressure or very low pressure processing.

**3.1.2** Dished end vessels are applicable for pressure or vacuum operation and the standard is based on the following types, namely, hemispherical, semiellipsoidal or equivalent torispherical (deep dished) and torispherical with spherical radius equal to  $D$  and inside corner radius to  $0.10D$  and  $0.06D$ .

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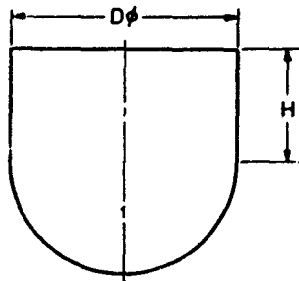
\*Recommendation on nominal capacities for process equipment.

†Formed ends for tanks and pressure vessels (*First revision*).

**TABLE 1 VERTICAL CYLINDRICAL VESSELS, OPEN OR FLAT TOP, HEMISPHERICAL BOTTOM AND LENGTH ON STRAIGHT**  
**(H) = APPROXIMATELY 0.5D**

( Clause 1.1 )

Suitable for use as evaporating pans, mixers, reaction vessels, stills, powder driers, etc.

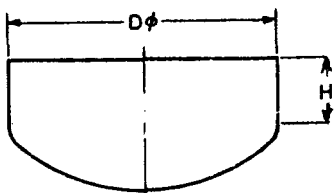


| Sl. No. | NOMINAL CAPACITY | DIAMETER D | LENGTH ON STRAIGHT H | VOLUME   |           |
|---------|------------------|------------|----------------------|----------|-----------|
|         |                  |            |                      | Cylinder | Aggregate |
| (1)     | (2)              | (3)        | (4)                  | (5)      | (6)       |
|         | litres           | mm         | mm                   | litres   | litres    |
| 1       | 10               | 250        | 125                  | 6.1      | 10.2      |
| 2       | 16               | 300        | 150                  | 10.6     | 17.6      |
| 3       | 25               | 350        | 175                  | 16.8     | 28        |
| 4       | 40               | 400        | 200                  | 25       | 41        |
| 5       | 63               | 500        | 200                  | 39       | 71        |
| 6       | 100              | 600        | 200                  | 56       | 112       |
| 7       | 160              | 600        | 370                  | 104      | 160       |
| 8       | 250              | 700        | 420                  | 161      | 250       |
| 9       | 400              | 800        | 530                  | 266      | 400       |
| 10      | 630              | 1 000      | 500                  | 392      | 654       |
| 11      | 1 000            | 1 200      | 520                  | 587      | 1 039     |
| 12      | (1 250)          | 1 200      | 710                  | 802      | 1 254     |
| 13      | 1 600            | 1 300      | 780                  | 1 037    | 1 612     |
| 14      | 2 000            | 1 400      | 840                  | 1 293    | 2 011     |
| 15      | 2 500            | 1 600      | 750                  | 1 507    | 2 579     |
| 16      | (3 200)          | 1 700      | 850                  | 1 929    | 3 215     |
| 17      | 4 000            | 1 800      | 1 000                | 2 540    | 4 066     |
| 18      | 5 000            | 1 900      | 1 140                | 3 237    | 5 032     |
| 19      | 6 300            | 2 100      | 1 140                | 3 944    | 6 370     |
| 20      | (8 000)          | 2 300      | 1 170                | 4 855    | 8 039     |
| 21      | 10 000           | 2 400      | 1 440                | 6 508    | 10 124    |
| 22      | 12 500           | 2 600      | 1 500                | 7 965    | 12 565    |
| 23      | 16 000           | 2 800      | 1 670                | 10 287   | 16 033    |
| 24      | 20 000           | 3 200      | 1 450                | 11 658   | 20 234    |
| 25      | 25 000           | 3 400      | 1 650                | 14 982   | 25 266    |
| 26      | 32 000           | 3 600      | 1 950                | 19 890   | 32 100    |
| 27      | 40 000           | 4 000      | 1 900                | 23 940   | 40 690    |
| 28      | 50 000           | 4 250      | 2 150                | 30 530   | 50 620    |
| 29      | 63 000           | 4 500      | 2 500                | 39 750   | 63 490    |
| 30      | 80 000           | 5 000      | 2 450                | 48 020   | 80 740    |

**TABLE 2 VERTICAL CYLINDRICAL VESSELS, OPEN OR FLAT TOP, WITH DEEP DISHED ( SEMIELLIPSOIDAL OR EQUIVALENT TORISPHERICAL ) BOTTOM AND LENGTH ON STRAIGHT (H) = APPROXIMATELY 0.25D**

( Clause 1.1 )

Suitable for use as evaporating pans, powder driers, etc.

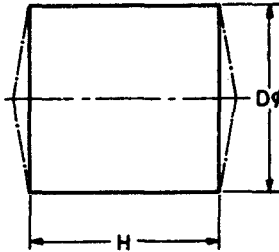
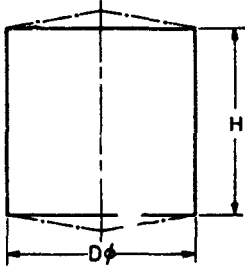


| Sl. No. | NOMINAL CAPACITY | DIAMETER<br>D | LENGTH ON STRAIGHT<br>H | VOLUME   |           |
|---------|------------------|---------------|-------------------------|----------|-----------|
|         |                  |               |                         | Cylinder | Aggregate |
| (1)     | (2)              | (3)           | (4)                     | (5)      | (6)       |
|         | litres           | mm            | mm                      | litres   | litres    |
| 1       | 10               | 350           | 70                      | 6.7      | 12.3      |
| 2       | 16               | 400           | 90                      | 11.2     | 19.5      |
| 3       | 25               | 400           | 135                     | 16.8     | 25.2      |
| 4       | 40               | 500           | 125                     | 24.5     | 40.9      |
| 5       | 63               | 600           | 130                     | 36.6     | 64.9      |
| 6       | 100              | 700           | 160                     | 61.6     | 106       |
| 7       | 160              | 800           | 200                     | 100      | 167       |
| 8       | 250              | 900           | 250                     | 159      | 254       |
| 9       | 400              | 1 100         | 250                     | 237      | 411       |
| 10      | 630              | 1 300         | 300                     | 399      | 687       |
| 11      | 1 000            | 1 500         | 350                     | 619      | 1 061     |
| 12      | (1 250)          | 1 600         | 380                     | 763      | 1 299     |
| 13      | 1 600            | 1 700         | 425                     | 964      | 1 607     |
| 14      | 2 000            | 1 800         | 490                     | 1 244    | 2 007     |
| 15      | 2 500            | 2 000         | 500                     | 1 570    | 2 618     |
| 16      | (3 200)          | 2 200         | 500                     | 1 900    | 3 294     |
| 17      | 4 000            | 2 300         | 600                     | 2 490    | 4 087     |
| 18      | 5 000            | 2 400         | 720                     | 3 254    | 5 062     |
| 19      | 6 300            | 2 600         | 760                     | 4 035    | 6 335     |
| 20      | (8 000)          | 3 000         | 650                     | 4 595    | 8 129     |
| 21      | 10 000           | 3 200         | 750                     | 6 030    | 10 318    |
| 22      | 12 500           | 3 400         | 820                     | 7 445    | 12 587    |
| 23      | 16 000           | 3 600         | 1 000                   | 10 200   | 16 305    |
| 24      | 20 000           | 4 000         | 1 000                   | 12 600   | 20 975    |
| 25      | 25 000           | 4 250         | 1 150                   | 16 330   | 25 418    |
| 26      | 30 000           | 4 500         | 1 150                   | 18 285   | 30 155    |
| 27      | 40 000           | 5 000         | 1 250                   | 24 500   | 40 860    |

**TABLE 3 CYLINDRICAL VESSELS, VERTICAL OR HORIZONTAL,  
FLAT OR CONICAL ENDS AND HEIGHT OR LENGTH ON  
STRAIGHT (H) = APPROXIMATELY D**

( Clause 1.1 )

Suitable for use as mixers, stills, tanks, extraction vessels, etc.

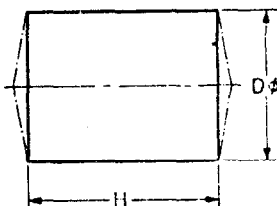
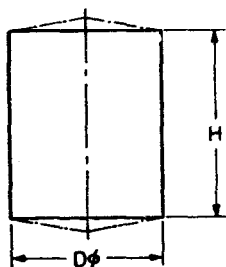


| SL<br>No. | NOMINAL<br>CAPACITY | DIA-<br>METER<br>D | LENGTH ON<br>STRAIGHT<br>H | CYLINDER<br>VOLUME | AGGREGATE VOLUME  |  |                               |
|-----------|---------------------|--------------------|----------------------------|--------------------|-------------------|--|-------------------------------|
|           |                     |                    |                            |                    | Both Ends<br>Flat | One End<br>Open or Flat<br>and Other<br>Conical<br>(10°) | Both Ends<br>Conical<br>(10°) |
| (1)       | (2)<br>litres       | (3)<br>mm          | (4)<br>mm                  | (5)<br>litres      | (6)<br>litres     | (7)<br>litres  | (8)<br>litres                 |
| 1         | 10                  | 250                | 225                        | 11.0               | 11.0              | 11.3   | 11.7                          |
| 2         | 16                  | 300                | 250                        | 17.5               | 17.7              | 18.3   | 18.9                          |
| 3         | 25                  | 350                | 300                        | 28.8               | 28.8              | 29.7   | 30.7                          |
| 4         | 40                  | 400                | 350                        | 43.7               | 43.7              | 45.1   | 46.6                          |
| 5         | 63                  | 400                | 510                        | 63.7               | 63.7              | 65.1   | 66.6                          |
| 6         | 100                 | 500                | 520                        | 101                | 101               | 103  | 106                           |
| 7         | 160                 | 600                | 580                        | 163                | 163               | 167  | 172                           |
| 8         | 250                 | 700                | 660                        | 254                | 254               | 261  | 269                           |
| 9         | 400                 | 800                | 800                        | 401                | 401               | 412  | 424                           |
| 10        | 630                 | 900                | 1 000                      | 636                | 636               | 652  | 669                           |
| 11        | 1 000               | 1 100              | 1 060                      | 1 007              | 1 007             | 1 037  | 1 068                         |
| 12        | (1 250)             | 1 200              | 1 120                      | 1 265              | 1 263             | 1 304  | 1 344                         |
| 13        | 1 600               | 1 300              | 1 210                      | 1 609              | 1 609             | 1 659  | 1 710                         |
| 14        | 2 000               | 1 400              | 1 315                      | 2 025              | 2 025             | 2 088  | 2 150                         |
| 15        | 2 500               | 1 500              | 1 420                      | 2 513              | 2 513             | 2 590  | 2 668                         |
| 16        | (3 200)             | 1 600              | 1 600                      | 3 216              | 3 216             | 3 310  | 3 404                         |
| 17        | 4 000               | 1 700              | 1 770                      | 4 017              | 4 017             | 4 130  | 4 243                         |
| 18        | 5 000               | 1 900              | 1 770                      | 5 026              | 5 026             | 5 184  | 5 342                         |
| 19        | 6 300               | 2 000              | 2 010                      | 6 311              | 6 311             | 6 495  | 6 679                         |
| 20        | (8 000)             | 2 200              | 2 110                      | 8 018              | 8 018             | 8 263  | 8 508                         |
| 21        | 10 000              | 2 300              | 2 420                      | 10 043             | 10 043            | 10 323   | 10 603                        |
| 22        | 12 500              | 2 600              | 2 360                      | 12 531             | 12 531            | 12 908   | 13 285                        |
| 23        | 16 000              | 2 800              | 2 610                      | 16 077             | 16 077            | 16 582   | 17 067                        |
| 24        | 20 000              | 3 000              | 2 840                      | 20 078             | 20 078            | 20 699   | 21 320                        |
| 25        | 25 000              | 3 200              | 3 120                      | 25 084             | 25 084            | 25 838   | 26 592                        |
| 26        | 32 000              | 3 400              | 3 530                      | 32 052             | 32 052            | 32 956   | 33 860                        |
| 27        | 40 000              | 3 800              | 3 540                      | 40 002             | 40 002            | 41 264   | 42 526                        |
| 28        | 50 000              | 4 000              | 3 980                      | 50 148             | 50 148            | 51 620   | 53 092                        |
| 29        | 63 000              | 4 250              | 4 450                      | 63 190             | 63 190            | 64 956   | 66 722                        |
| 30        | 80 000              | 4 750              | 4 530                      | 80 181             | 80 181            | 82 646   | 85 111                        |

**TABLE 4 CYLINDRICAL VESSELS, VERTICAL OR HORIZONTAL,  
FLAT OR CONICAL ENDS AND HEIGHT OR LENGTH ON  
STRAIGHT (H) = APPROXIMATELY 1.25D**

( Clause 1.1 )

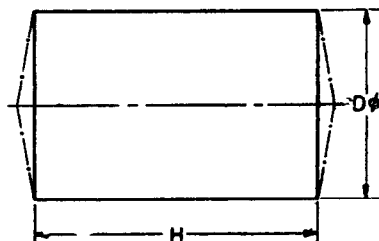
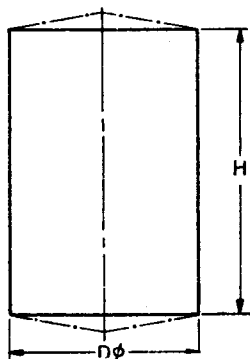
Suitable for use as mixers, stills, tanks, extraction vessels, etc.



| Sl.<br>No. | NOMINAL<br>CAPACITY | DIA-<br>METER<br>D | LENGTH ON<br>STRAIGHT<br>H | CYLINDER<br>VOLUME | AGGREGATE VOLUME  |   |                               |
|------------|---------------------|--------------------|----------------------------|--------------------|-------------------|---|-------------------------------|
|            |                     |                    |                            |                    | Both Ends<br>Flat | One End<br>Open or<br>Flat and<br>Other<br>Conical<br>(10°) | Both Ends<br>Conical<br>(10°) |
| (1)        | (2)<br>litres       | (3)<br>mm          | (4)<br>mm                  | (5)<br>litres      | (6)<br>litres     | (7)<br>litres   | (8)<br>litres                 |
| 1          | 16                  | 250                | 325                        | 15.9               | 15.9              | 16.2  | 16.6                          |
| 2          | 25                  | 300                | 375                        | 26.5               | 26.5              | 27.1  | 27.7                          |
| 3          | 40                  | 350                | 438                        | 42.1               | 42.1              | 43.0  | 44.0                          |
| 4          | 63                  | 400                | 510                        | 64.0               | 64.0              | 65.4  | 66.9                          |
| 5          | 400                 | 800                | 900                        | 452                | 452               | 463   | 475                           |
| 6          | 630                 | 900                | 1 100                      | 700                | 700               | 716   | 733                           |
| 7          | 1 000               | 1 000              | 1 275                      | 1 001              | 1 001             | 1 024   | 1 047                         |
| 8          | 1 250               | 1 100              | 1 375                      | 1 306              | 1 306             | 1 336   | 1 367                         |
| 9          | 1 600               | 1 200              | 1 500                      | 1 696              | 1 696             | 1 735   | 1 775                         |
| 10         | 2 000               | 1 300              | 1 600                      | 2 128              | 2 128             | 2 178   | 2 229                         |
| 11         | 2 500               | 1 400              | 1 700                      | 2 618              | 2 618             | 2 681   | 2 744                         |
| 12         | 3 200               | 1 500              | 1 825                      | 3 230              | 3 230             | 3 307   | 3 385                         |
| 13         | 4 000               | 1 600              | 2 000                      | 4 020              | 4 020             | 4 114   | 4 208                         |
| 14         | 5 000               | 1 700              | 2 200                      | 4 994              | 4 994             | 5 107   | 5 220                         |
| 15         | 6 300               | 1 900              | 2 300                      | 6 532              | 6 532             | 6 690   | 6 848                         |
| 16         | 8 000               | 2 000              | 2 550                      | 8 007              | 8 007             | 8 191   | 8 375                         |
| 17         | 10 000              | 2 200              | 2 700                      | 10 260             | 10 260            | 10 505  | 10 750                        |
| 18         | 12 500              | 2 400              | 2 900                      | 13 120             | 13 120            | 13 438  | 13 756                        |
| 19         | 16 000              | 2 600              | 3 200                      | 16 990             | 16 990            | 17 394  | 17 798                        |
| 20         | 20 000              | 2 800              | 3 400                      | 20 940             | 20 940            | 21 445  | 21 950                        |
| 21         | 25 000              | 3 000              | 3 700                      | 26 150             | 26 150            | 26 771  | 27 392                        |
| 22         | 32 000              | 3 200              | 4 000                      | 32 170             | 32 170            | 32 924  | 33 678                        |
| 23         | 50 000              | 3 800              | 4 500                      | 50 850             | 50 850            | 52 112  | 53 374                        |
| 24         | 63 000              | 4 000              | 5 050                      | 63 560             | 63 560            | 65 032  | 66 504                        |
| 25         | 80 000              | 4 250              | 5 650                      | 80 230             | 80 230            | 81 996  | 83 762                        |

**TABLE 5 CYLINDRICAL VESSELS, VERTICAL OR HORIZONTAL,  
FLAT OR CONICAL ENDS AND HEIGHT OR LENGTH ON  
STRAIGHT ( $H$ ) = APPROXIMATELY  $1.5D$**   
(Clause 1.1)

Suitable for use as mixers, stills, tanks, extraction vessels, etc.

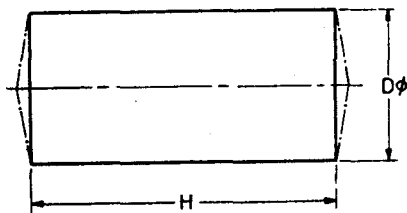
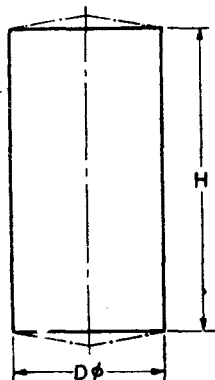


| SL<br>No. | NOMINAL<br>CAPACITY | DIA-<br>METER<br>$D$ | LENGTH ON<br>STRAIGHT<br>$H$ | CYLINDER<br>VOLUME | AGGREGATE VOLUME  |  |  |
|-----------|---------------------|----------------------|------------------------------|--------------------|-------------------|--|--|
|           |                     |                      |                              |                    | Both Ends<br>Flat | One End<br>Open or<br>Flat and<br>Other<br>Conical<br>( $10^\circ$ ) | Both Ends<br>Conical<br>( $10^\circ$ ) |
| (1)       | (2)<br>litres       | (3)<br>mm            | (4)<br>mm                    | (5)<br>litres      | (6)<br>litres     | (7)<br>litres  | (8)<br>litres                          |
| 1         | 10                  | 200                  | 330                          | 10.2               | 10.2              | 10.3   | 10.5                                   |
| 2         | 16                  | 250                  | 350                          | 17.1               | 17.1              | 17.4   | 17.8                                   |
| 3         | 25                  | 300                  | 420                          | 29.8               | 29.8              | 30.4   | 31.0                                   |
| 4         | 40                  | 350                  | 490                          | 47.0               | 47.0              | 47.9   | 48.9                                   |
| 5         | 63                  | 400                  | 560                          | 70.0               | 70.0              | 71.4   | 72.9                                   |
| 6         | 160                 | 500                  | 820                          | 160                | 160               | 162  | 165                                    |
| 7         | 250                 | 600                  | 900                          | 253                | 253               | 257  | 262                                    |
| 8         | 400                 | 700                  | 1 050                        | 404                | 404               | 411  | 419                                    |
| 9         | 630                 | 800                  | 1 270                        | 637                | 637               | 648  | 660                                    |
| 10        | 1 000               | 1 000                | 1 400                        | 1 099              | 1 099             | 1 122  | 1 145                                  |
| 11        | (1 250)             | 1 000                | 1 600                        | 1 256              | 1 256             | 1 279  | 1 302                                  |
| 12        | 1 600               | 1 100                | 1 700                        | 1 615              | 1 615             | 1 645  | 1 676                                  |
| 13        | 2 000               | 1 200                | 1 800                        | 2 034              | 2 034             | 2 073  | 2 113                                  |
| 14        | 2 500               | 1 300                | 1 900                        | 2 527              | 2 527             | 2 577  | 2 628                                  |
| 15        | (3 200)             | 1 400                | 2 100                        | 3 234              | 3 234             | 3 297  | 3 360                                  |
| 16        | 4 000               | 1 500                | 2 270                        | 4 017              | 4 017             | 4 094  | 4 172                                  |
| 17        | 5 000               | 1 600                | 2 500                        | 5 025              | 5 025             | 5 119  | 5 213                                  |
| 18        | 6 300               | 1 700                | 2 780                        | 6 310              | 6 310             | 6 423  | 6 536                                  |
| 19        | (8 000)             | 1 900                | 2 850                        | 8 094              | 8 094             | 8 252  | 8 410                                  |
| 20        | 10 000              | 2 000                | 3 200                        | 10 048             | 10 048            | 10 232   | 10 416                                 |
| 21        | 12 500              | 2 200                | 3 300                        | 12 540             | 12 540            | 12 785   | 13 030                                 |
| 22        | 16 000              | 2 400                | 3 550                        | 16 046             | 16 046            | 16 364   | 16 682                                 |
| 23        | 20 000              | 2 600                | 3 780                        | 20 071             | 20 071            | 20 475   | 20 879                                 |
| 24        | 25 000              | 2 800                | 4 070                        | 25 071             | 25 071            | 25 576   | 26 081                                 |
| 25        | 32 000              | 3 000                | 4 540                        | 32 097             | 32 097            | 32 718   | 33 339                                 |
| 26        | 40 000              | 3 200                | 4 980                        | 40 039             | 40 039            | 40 793   | 41 547                                 |
| 27        | 50 000              | 3 400                | 5 510                        | 50 030             | 50 030            | 50 934   | 51 838                                 |
| 28        | 63 000              | 3 800                | 5 580                        | 63 054             | 63 054            | 64 316   | 65 578                                 |
| 29        | 80 000              | 4 000                | 6 350                        | 80 010             | 80 010            | 81 482   | 82 954                                 |

**TABLE 6 CYLINDRICAL VESSELS, VERTICAL OR HORIZONTAL, FLAT OR CONICAL ENDS AND HEIGHT OR LENGTH ON STRAIGHT ( $H$ ) = APPROXIMATELY  $2D$**

( Clause 1.1 )

Suitable for use as mixers, stills, tanks, extraction vessels, etc.



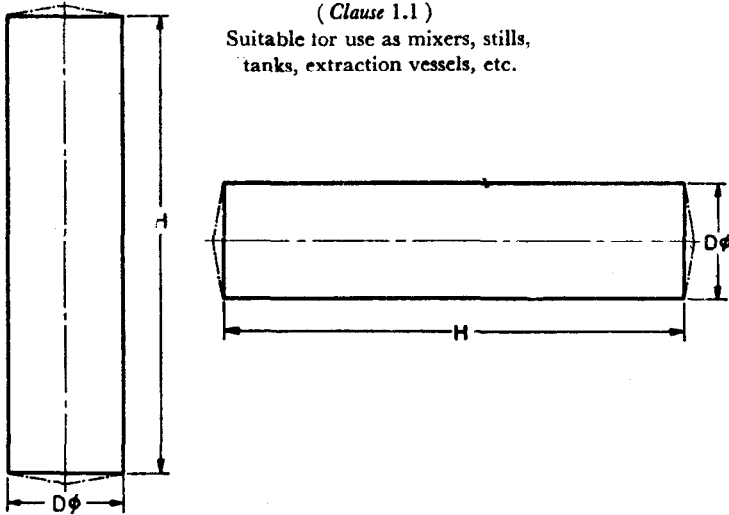
| Sl. No. | NOMINAL CAPACITY | DIA-METER $D$ | LENGTH ON STRAIGHT $H$ | CYLINDER VOLUME | AGGREGATE VOLUME |   |                                  |
|---------|------------------|---------------|------------------------|-----------------|------------------|---|----------------------------------|
|         |                  |               |                        |                 | Both Ends Flat   | One End Open or Flat and Other Conical ( $10^\circ$ ) | Both Ends Conical ( $10^\circ$ ) |
| (1)     | (2)<br>litres    | (3)<br>mm     | (4)<br>mm              | (5)<br>litres   | (6)<br>litres    | (7)<br>litres   | (8)<br>litres                    |
| 1       | 10               | 200           | 400                    | 12.4            | 12.5             | 12.4  | 12.7                             |
| 2       | 25               | 250           | 520                    | 25.4            | 25.4             | 25.7  | 26.1                             |
| 3       | 40               | 300           | 570                    | 40.0            | 40.0             | 40.6  | 41.2                             |
| 4       | 63               | 350           | 665                    | 63.8            | 63.8             | 64.7  | 65.7                             |
| 5       | 100              | 400           | 800                    | 100             | 100              | 101   | 102                              |
| 6       | 1 000            | 900           | 1 710                  | 1 087           | 1 087            | 1 103   | 1 120                            |
| 7       | (1 250)          | 900           | 1 970                  | 1 252           | 1 252            | 1 268   | 1 285                            |
| 8       | 1 600            | 1 000         | 2 040                  | 1 601           | 1 601            | 1 624   | 1 647                            |
| 9       | 2 000            | 1 100         | 2 120                  | 2 014           | 2 014            | 2 044   | 2 075                            |
| 10      | 2 500            | 1 200         | 2 280                  | 2 576           | 2 576            | 2 615   | 2 655                            |
| 11      | (3 200)          | 1 300         | 2 470                  | 3 285           | 3 285            | 3 335   | 3 386                            |
| 12      | 4 000            | 1 400         | 2 660                  | 4 096           | 4 096            | 4 159   | 4 222                            |
| 13      | 5 000            | 1 500         | 2 850                  | 5 044           | 5 044            | 5 121   | 5 199                            |
| 14      | 6 300            | 1 600         | 3 140                  | 6 311           | 6 311            | 6 405   | 6 499                            |
| 15      | (8 000)          | 1 700         | 3 530                  | 8 013           | 8 013            | 8 126   | 8 239                            |
| 16      | 10 000           | 1 900         | 3 610                  | 10 252          | 10 252           | 10 410  | 10 568                           |
| 17      | 12 500           | 2 000         | 4 000                  | 12 560          | 12 560           | 12 744  | 12 928                           |
| 18      | 16 000           | 2 200         | 4 220                  | 16 036          | 16 036           | 16 281  | 16 526                           |
| 19      | 20 000           | 2 300         | 4 820                  | 20 003          | 20 003           | 20 283  | 20 563                           |
| 20      | 25 000           | 2 600         | 4 940                  | 26 231          | 26 231           | 26 635  | 27 040                           |
| 21      | 32 000           | 2 800         | 5 320                  | 32 771          | 32 771           | 33 275  | 33 781                           |
| 22      | 40 000           | 3 000         | 5 700                  | 40 299          | 40 299           | 40 920  | 41 541                           |
| 23      | 50 000           | 3 200         | 6 230                  | 50 089          | 50 089           | 50 843  | 51 597                           |
| 24      | 63 000           | 3 400         | 6 940                  | 63 015          | 63 015           | 68 919  | 64 823                           |
| 25      | 80 000           | 3 800         | 7 220                  | 81 586          | 81 586           | 82 848  | 84 110                           |



**TABLE 7 CYLINDRICAL VESSELS, VERTICAL OR HORIZONTAL,  
FLAT OR CONICAL ENDS AND HEIGHT OR LENGTH ON  
STRAIGHT (H) = APPROXIMATELY 3D**

( Clause 1.1 )

Suitable for use as mixers, stills,  
tanks, extraction vessels, etc.

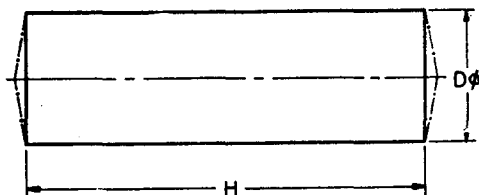
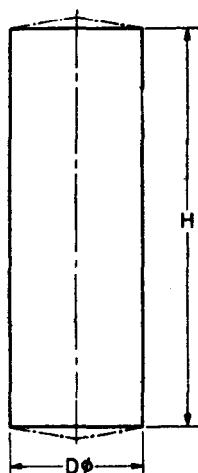


| Sl.<br>No. | NOMINAL<br>CAPACITY | DIA-<br>METER<br>D | LENGTH ON<br>STRAIGHT<br>H | CYLINDER<br>VOLUME | AGGREGATE VOLUME  |   |                              |
|------------|---------------------|--------------------|----------------------------|--------------------|-------------------|---|------------------------------|
|            |                     |                    |                            |                    | Both Ends<br>Flat | One End<br>Open or<br>Flat and<br>Other<br>Conical<br>(10°) | Both End<br>Conical<br>(10°) |
| (1)        | (2)<br>litres       | (3)<br>mm          | (4)<br>mm                  | (5)<br>litres      | (6)<br>litres     | (7)<br>litres   | (8)<br>litres                |
| 1          | 16                  | 200                | 520                        | 16.1               | 16.1              | 16.3  | 16.5                         |
| 2          | 40                  | 250                | 820                        | 40.1               | 40.1              | 40.4  | 40.8                         |
| 3          | 63                  | 300                | 900                        | 63.9               | 63.9              | 64.5  | 65.1                         |
| 4          | 100                 | 350                | 1 050                      | 100                | 100               | 101   | 102                          |
| 5          | 160                 | 400                | 1 280                      | 160                | 160               | 161   | 162                          |
| 6          | 250                 | 500                | 1 300                      | 254                | 254               | 257   | 260                          |
| 7          | 400                 | 600                | 1 500                      | 423                | 423               | 428   | 433                          |
| 8          | 1 000               | 800                | 2 000                      | 1 004              | 1 004             | 1 015   | 1 027                        |
| 9          | (1 250)             | 800                | 2 500                      | 1 255              | 1 255             | 1 266   | 1 278                        |
| 10         | 1 600               | 900                | 2 600                      | 1 653              | 1 653             | 1 669   | 1 686                        |
| 11         | 2 000               | 1 000              | 2 600                      | 2 041              | 2 041             | 2 064   | 2 087                        |
| 12         | 2 500               | 1 100              | 2 750                      | 2 612              | 2 612             | 2 642   | 2 673                        |
| 13         | (3 200)             | 1 100              | 3 400                      | 3 230              | 3 230             | 3 260   | 3 291                        |
| 14         | 4 000               | 1 200              | 3 600                      | 4 068              | 4 068             | 4 107   | 4 147                        |
| 15         | 5 000               | 1 300              | 3 800                      | 5 054              | 5 054             | 5 104   | 5 155                        |
| 16         | 6 300               | 1 400              | 4 100                      | 6 314              | 6 314             | 6 377   | 6 440                        |
| 17         | (8 000)             | 1 500              | 4 550                      | 8 053              | 8 053             | 8 130   | 8 208                        |
| 18         | 10 000              | 1 600              | 5 000                      | 10 050             | 10 050            | 10 144  | 10 238                       |
| 19         | 12 500              | 1 800              | 5 000                      | 12 700             | 12 700            | 12 834  | 12 968                       |
| 20         | 16 000              | 1 900              | 5 700                      | 16 188             | 16 188            | 16 346  | 16 504                       |
| 21         | 20 000              | 2 000              | 6 400                      | 20 096             | 20 096            | 20 280  | 20 464                       |
| 22         | 25 000              | 2 200              | 6 600                      | 25 080             | 25 080            | 20 305  | 25 570                       |
| 23         | 32 000              | 2 400              | 7 100                      | 32 092             | 32 092            | 32 410  | 32 728                       |
| 24         | 40 000              | 2 600              | 7 600                      | 40 356             | 40 356            | 40 760  | 41 164                       |
| 25         | 50 000              | 2 800              | 8 200                      | 50 572             | 50 572            | 51 017  | 51 522                       |
| 26         | 63 000              | 3 000              | 9 000                      | 63 630             | 63 630            | 64 251  | 64 872                       |
| 27         | 80 000              | 3 200              | 10 000                     | 80 400             | 80 400            | 81 154  | 81 908                       |

**TABLE 8 CYLINDRICAL VESSELS, VERTICAL OR HORIZONTAL, FLAT OR CONICAL ENDS AND HEIGHT OR LENGTH ON STRAIGHT ( $H$ ) = APPROXIMATELY  $4D$**

( Clause 1.1 )

Suitable for use as mixers, stills, tanks, extraction vessels, etc.

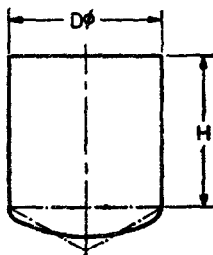


| Sl. No. | NOMINAL CAPACITY | DIA- METER $D$ | LENGTH ON STRAIGHT $H$ | CYLINDER VOLUME | AGGREGATE VOLUME |   |                                  |
|---------|------------------|----------------|------------------------|-----------------|------------------|---|----------------------------------|
|         |                  |                |                        |                 | Both Ends Flat   | One End Flat and Other Conical ( $10^\circ$ ) | Both Ends Conical ( $10^\circ$ ) |
| (1)     | (2)<br>litres    | (3)<br>mm      | (4)<br>mm              | (5)<br>litres   | (6)<br>litres    | (7)<br>litres                                 | (8)<br>litres                    |
| 1       | 10               | 150            | 600                    | 10.2            | 10.2             | 10.2  | 10.3                             |
| 2       | 25               | 200            | 810                    | 25.1            | 25.1             | 25.2  | 25.4                             |
| 3       | 40               | 250            | 880                    | 43.1            | 43.1             | 43.4  | 43.8                             |
| 4       | 100              | 300            | 1 410                  | 100             | 100              | 100   | 101                              |
| 5       | 160              | 350            | 1 670                  | 160             | 160              | 160   | 161                              |
| 6       | 400              | 500            | 2 050                  | 401             | 401              | 403   | 406                              |
| 7       | 630              | 600            | 2 300                  | 648             | 648              | 653   | 658                              |
| 8       | 1 000            | 700            | 2 700                  | 1 039           | 1 039            | 1 047   | 1 055                            |
| 9       | 1 600            | 800            | 3 200                  | 1 606           | 1 606            | 1 618   | 1 640                            |
| 10      | 2 500            | 900            | 3 950                  | 2 512           | 2 512            | 2 528   | 2 545                            |
| 11      | (3 200)          | 1 000          | 4 100                  | 3 218           | 3 218            | 3 241   | 3 264                            |
| 12      | 4 000            | 1 100          | 4 300                  | 4 085           | 4 085            | 4 115   | 4 146                            |
| 13      | 5 000            | 1 200          | 4 500                  | 5 085           | 5 085            | 5 124   | 5 164                            |
| 14      | 6 300            | 1 300          | 4 800                  | 6 384           | 6 384            | 6 434   | 6 485                            |
| 15      | (8 000)          | 1 400          | 5 300                  | 8 162           | 8 162            | 8 225   | 8 288                            |
| 16      | 10 000           | 1 500          | 5 700                  | 10 089          | 10 089           | 10 166  | 10 244                           |
| 17      | 12 500           | 1 600          | 6 300                  | 12 663          | 12 663           | 12 757  | 12 851                           |
| 18      | 16 000           | 1 700          | 7 100                  | 16 117          | 16 117           | 16 230  | 16 343                           |
| 19      | 20 000           | 1 900          | 7 200                  | 20 448          | 20 448           | 20 606  | 20 764                           |
| 20      | 25 000           | 2 000          | 8 000                  | 25 120          | 25 120           | 25 304  | 25 488                           |
| 21      | 32 000           | 2 200          | 8 500                  | 32 300          | 32 300           | 32 525  | 32 750                           |
| 22      | 40 000           | 2 300          | 9 700                  | 40 255          | 40 255           | 40 535  | 40 815                           |
| 23      | 50 000           | 2 600          | 9 700                  | 51 507          | 51 507           | 51 911  | 52 315                           |
| 24      | 63 000           | 2 800          | 10 300                 | 63 448          | 63 448           | 63 953  | 64 458                           |
| 25      | 80 000           | 3 000          | 11 500                 | 81 305          | 81 305           | 87 926  | 82 547                           |

**TABLE 9 VERTICAL CYLINDRICAL VESSELS, OPEN OR FLAT TOP, FORMED BOTTOM AND LENGTH ON STRAIGHT (H) = APPROXIMATELY D**

( Clause 1.1 )

Suitable for use as stills, mixers, reaction vessels, for extraction tanks.

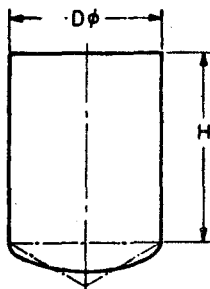


| SL. No. | NOMINAL CAPACITY | DIA- METER D | LENGTH ON STRAIGHT H | CYLINDER VOLUME | AGGREGATE VOLUME |                               |               |                           |
|---------|------------------|--------------|----------------------|-----------------|------------------|-------------------------------|---------------|---------------------------|
|         |                  |              |                      |                 | 30° Conical      | Torispherical, Knuckle Radius |               | Deep Dishd or 45° Conical |
|         |                  |              |                      |                 |                  | 0·06D                         | 0·10D         |                           |
| (1)     | (2)<br>litres    | (3)<br>mm    | (4)<br>mm            | (5)<br>litres   | (6)<br>litres    | (7)<br>litres                 | (8)<br>litres | (9)<br>litres             |
| 1       | 10               | 250          | 225                  | 11·0            | 12·1             | 12·3                          | 12·7          | 13·0                      |
| 2       | 16               | 300          | 250                  | 17·7            | 19·7             | 20·0                          | 20·7          | 21·2                      |
| 3       | 25               | 300          | 325                  | 23·0            | 25·0             | 25·3                          | 26·0          | 26·5                      |
| 4       | 40               | 350          | 400                  | 38·4            | 41·6             | 42·0                          | 43·1          | 44·0                      |
| 5       | 63               | 400          | 475                  | 59·3            | 64·2             | 64·8                          | 66·4          | 67·6                      |
| 6       | 100              | 500          | 500                  | 98·0            | 107              | 108                           | 111           | 114                       |
| 7       | 160              | 600          | 550                  | 155             | 171              | 173                           | 179           | 183                       |
| 8       | 250              | 700          | 625                  | 240             | 266              | 269                           | 278           | 284                       |
| 9       | 400              | 800          | 750                  | 376             | 414              | 420                           | 432           | 443                       |
| 10      | 630              | 900          | 925                  | 588             | 643              | 650                           | 668           | 683                       |
| 11      | 1 000            | 1 100        | 1 000                | 950             | 1 051            | 1 064                         | 1 098         | 1 124                     |
| 12      | (1 250)          | 1 100        | 1 210                | 1 149           | 1 250            | 1 265                         | 1 297         | 1 323                     |
| 13      | 1 600            | 1 200        | 1 300                | 1 469           | 1 600            | 1 617                         | 1 661         | 1 695                     |
| 14      | 2 000            | 1 300        | 1 400                | 1 862           | 2 029            | 2 051                         | 2 106         | 2 150                     |
| 15      | 2 500            | 1 400        | 1 500                | 2 310           | 2 518            | 2 546                         | 2 614         | 2 669                     |
| 16      | (3 200)          | 1 600        | 1 500                | 3 015           | 3 326            | 3 337                         | 3 470         | 3 551                     |
| 17      | 4 000            | 1 700        | 1 650                | 3 745           | 4 118            | 4 167                         | 4 290         | 4 388                     |
| 18      | 5 000            | 1 800        | 1 800                | 4 572           | 5 015            | 5 073                         | 5 219         | 5 335                     |
| 19      | 6 300            | 2 000        | 1 850                | 5 809           | 6 417            | 6 496                         | 6 696         | 6 857                     |
| 20      | (8 000)          | 2 100        | 2 120                | 7 335           | 8 039            | 8 130                         | 8 362         | 8 548                     |
| 21      | 10 000           | 2 300        | 2 200                | 9 130           | 10 054           | 10 175                        | 10 479        | 10 723                    |
| 22      | (12 500)         | 2 400        | 2 550                | 11 526          | 12 577           | 12 714                        | 13 059        | 13 334                    |
| 23      | 16 000           | 2 600        | 2 800                | 14 868          | 16 204           | 16 378                        | 16 817        | 17 168                    |
| 24      | 20 000           | 2 800        | 3 000                | 18 480          | 20 149           | 20 365                        | 20 914        | 21 353                    |
| 25      | 25 000           | 3 000        | 3 250                | 22 978          | 25 029           | 25 297                        | 25 972        | 26 512                    |
| 26      | 32 000           | 3 400        | 3 200                | 29 056          | 32 043           | 32 431                        | 33 414        | 34 201                    |
| 27      | 40 000           | 3 600        | 3 600                | 36 720          | 40 266           | 40 727                        | 41 895        | 42 825                    |
| 28      | 50 000           | 3 800        | 4 060                | 45 878          | 50 049           | 50 591                        | 51 963        | 53 061                    |
| 29      | 63 000           | 4 250        | 4 030                | 57 226          | 63 060           | 63 820                        | 65 739        | 67 276                    |
| 30      | 80 000           | 4 500        | 4 600                | 73 140          | 80 066           | 80 965                        | 83 240        | 85 070                    |

**TABLE 10 VERTICAL CYLINDRICAL VESSELS, OPEN OR FLAT TOP, FORMED BOTTOM AND LENGTH ON STRAIGHT (H) = APPROXIMATELY 1.25D**

( Clause 1.1 )

Suitable for use in stills, mixers, reaction vessels, for extraction tanks.

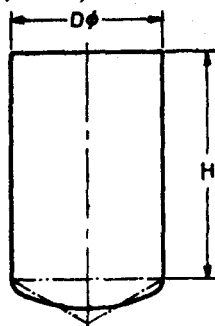


| Sl. No. | NOMINAL CAPACITY | DIA-METER<br><i>D</i> | LENGTH ON STRAIGHT<br><i>H</i> | CYLINDER VOLUME | AGGREGATE VOLUME |                               |               |                           |
|---------|------------------|-----------------------|--------------------------------|-----------------|------------------|-------------------------------|---------------|---------------------------|
|         |                  |                       |                                |                 | 30° Conical      | Torispherical, Knuckle Radius |               | Deep Dishd or 45° Conical |
|         |                  |                       |                                |                 |                  | 0.06 <i>D</i>                 | 0.10 <i>D</i> |                           |
| (1)     | (2)<br>litres    | (3)<br>mm             | (4)<br>mm                      | (5)<br>litres   | (6)<br>litres    | (7)<br>litres                 | (8)<br>litres | (9)<br>litres             |
| 1       | 16               | 250                   | 310                            | 15.2            | 16.3             | 16.5                          | 16.9          | 17.2                      |
| 2       | 25               | 300                   | 350                            | 24.8            | 26.8             | 27.1                          | 27.8          | 28.3                      |
| 3       | 40               | 350                   | 400                            | 38.4            | 41.6             | 42.0                          | 43.1          | 44.0                      |
| 4       | 63               | 400                   | 475                            | 59.3            | 64.1             | 64.8                          | 66.4          | 67.6                      |
| 5       | 400              | 800                   | 900                            | 452             | 490              | 496                           | 508           | 519                       |
| 6       | 630              | 900                   | 1 050                          | 667             | 722              | 729                           | 747           | 762                       |
| 7       | 1 000            | 1 000                 | 1 250                          | 981             | 1 057            | 1 066                         | 1 092         | 1 111                     |
| 8       | 1 250            | 1 100                 | 1 300                          | 1 235           | 1 336            | 1 349                         | 1 383         | 1 409                     |
| 9       | 1 600            | 1 200                 | 1 400                          | 1 582           | 1 713            | 1 730                         | 1 774         | 1 808                     |
| 10      | 2 000            | 1 300                 | 1 525                          | 2 028           | 2 195            | 2 217                         | 2 272         | 2 316                     |
| 11      | 2 500            | 1 400                 | 1 650                          | 2 541           | 2 749            | 2 277                         | 2 845         | 2 900                     |
| 12      | 3 200            | 1 500                 | 1 800                          | 3 186           | 3 442            | 3 776                         | 3 560         | 3 628                     |
| 13      | 4 000            | 1 600                 | 1 950                          | 3 919           | 4 230            | 4 271                         | 4 374         | 4 455                     |
| 14      | 5 000            | 1 700                 | 2 100                          | 4 767           | 5 140            | 5 189                         | 5 312         | 5 410                     |
| 15      | 6 300            | 1 800                 | 2 325                          | 5 905           | 6 348            | 6 406                         | 6 552         | 6 668                     |
| 16      | 8 000            | 2 000                 | 2 400                          | 7 536           | 8 144            | 8 223                         | 8 423         | 8 584                     |
| 17      | 10 000           | 2 100                 | 2 700                          | 9 342           | 10 046           | 10 137                        | 10 369        | 10 555                    |
| 18      | 12 500           | 2 300                 | 2 850                          | 11 827          | 12 751           | 12 872                        | 13 176        | 13 420                    |
| 19      | 25 000           | 2 800                 | 3 800                          | 23 408          | 25 077           | 25 293                        | 25 842        | 26 281                    |
| 20      | 32 000           | 3 200                 | 3 700                          | 31 080          | 33 570           | 33 894                        | 34 714        | 35 368                    |
| 21      | 40 000           | 3 400                 | 4 100                          | 37 228          | 40 215           | 40 603                        | 41 586        | 42 373                    |
| 22      | 50 000           | 3 600                 | 4 600                          | 46 920          | 50 466           | 50 927                        | 52 095        | 53 025                    |
| 23      | 63 000           | 4 000                 | 4 700                          | 59 220          | 64 085           | 64 716                        | 66 318        | 67 595                    |
| 24      | 80 000           | 4 250                 | 5 250                          | 74 550          | 80 384           | 81 144                        | 83 063        | 84 600                    |

**TABLE 11 VERTICAL CYLINDRICAL VESSELS, OPEN OR  
FLAT TOP, FORMED BOTTOM AND LENGTH ON  
STRAIGHT (H) = APPROXIMATELY 1.5D**

( Clause 1.1 )

Suitable for use as stills, mixers, reaction vessels, for extraction tanks.

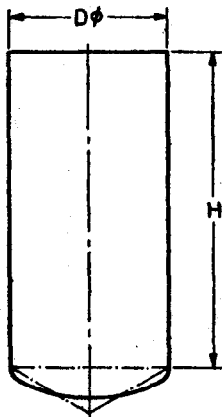


| SL. NO. | NOMINAL CAPACITY | DIA-<br>METER<br>D | LENGTH<br>ON<br>STRAIGHT<br>H | CYLINDER<br>VOLUME | AGGREGATE VOLUME |                                  |               |                                     |
|---------|------------------|--------------------|-------------------------------|--------------------|------------------|----------------------------------|---------------|-------------------------------------|
|         |                  |                    |                               |                    | 30°<br>Conical   | Torispherical,<br>Knuckle Radius |               | Deep<br>Dished or<br>45°<br>Conical |
|         |                  |                    |                               |                    |                  | 0.06D                            | 0.10D         |                                     |
| (1)     | (2)<br>litres    | (3)<br>mm          | (4)<br>mm                     | (5)<br>litres      | (6)<br>litres    | (7)<br>litres                    | (8)<br>litres | (9)<br>litres                       |
| 1       | 10               | 200                | 310                           | 9.61               | 10.2             | 10.3                             | 10.5          | 10.6                                |
| 2       | 16               | 250                | 350                           | 17.1               | 18.3             | 18.4                             | 18.8          | 19.2                                |
| 3       | 25               | 300                | 420                           | 29.8               | 31.8             | 32.1                             | 32.8          | 33.1                                |
| 4       | 40               | 350                | 490                           | 47.0               | 50.3             | 50.7                             | 51.8          | 52.6                                |
| 5       | 63               | 400                | 560                           | 70.0               | 74.8             | 75.5                             | 77.1          | 78.3                                |
| 6       | 160              | 500                | 770                           | 151                | 160              | 161                              | 164           | 167                                 |
| 7       | 250              | 600                | 840                           | 236                | 252              | 254                              | 260           | 264                                 |
| 8       | 400              | 700                | 980                           | 377                | 403              | 406                              | 415           | 421                                 |
| 9       | 630              | 800                | 1 180                         | 592                | 630              | 636                              | 648           | 659                                 |
| 10      | 1 000            | 900                | 1 490                         | 947                | 1 002            | 1 004                            | 1 027         | 1 042                               |
| 11      | (1 250)          | 1 000              | 1 500                         | 1 177              | 1 253            | 1 262                            | 1 288         | 1 308                               |
| 12      | 1 600            | 1 100              | 1 580                         | 1 501              | 1 602            | 1 615                            | 1 649         | 1 675                               |
| 13      | 2 000            | 1 200              | 1 680                         | 1 898              | 2 029            | 2 046                            | 2 090         | 2 124                               |
| 14      | 2 500            | 1 300              | 1 820                         | 2 420              | 2 587            | 2 609                            | 2 664         | 2 688                               |
| 15      | (3 200)          | 1 400              | 1 960                         | 3 018              | 3 226            | 3 254                            | 3 322         | 3 377                               |
| 16      | 4 000            | 1 500              | 2 120                         | 3 752              | 4 018            | 4 042                            | 4 126         | 4 194                               |
| 17      | 5 000            | 1 600              | 2 340                         | 4 703              | 5 014            | 5 055                            | 5 158         | 5 239                               |
| 18      | 6 300            | 1 700              | 2 620                         | 5 947              | 6 320            | 6 369                            | 6 492         | 6 590                               |
| 19      | (8 000)          | 1 900              | 2 660                         | 7 554              | 8 075            | 8 143                            | 8 315         | 8 452                               |
| 20      | 10 000           | 2 000              | 3 000                         | 9 420              | 10 028           | 10 107                           | 10 307        | 10 468                              |
| 21      | 12 500           | 2 200              | 3 080                         | 11 704             | 12 513           | 12 618                           | 12 885        | 13 098                              |
| 22      | 16 000           | 2 300              | 3 640                         | 15 106             | 16 030           | 16 151                           | 16 455        | 16 699                              |
| 23      | 20 000           | 2 600              | 3 640                         | 19 328             | 20 664           | 20 838                           | 21 277        | 21 628                              |
| 24      | 25 000           | 2 800              | 3 920                         | 24 147             | 25 816           | 26 032                           | 26 581        | 27 020                              |
| 25      | 32 000           | 3 000              | 4 240                         | 29 976             | 32 027           | 32 970                           | 32 970        | 33 510                              |
| 26      | 40 000           | 3 200              | 4 670                         | 37 546             | 40 036           | 41 187                           | 41 180        | 41 834                              |
| 27      | 50 000           | 3 400              | 5 180                         | 47 034             | 50 021           | 50 392                           | 51 392        | 52 179                              |
| 28      | 63 000           | 3 600              | 5 830                         | 59 466             | 63 012           | 64 641                           | 64 641        | 65 571                              |
| 29      | 80 000           | 4 000              | 5 970                         | 75 222             | 80 087           | 82 320                           | 82 320        | 83 597                              |

**TABLE 12 VERTICAL CYLINDRICAL VESSELS, OPEN OR FLAT TOP, FORMED BOTTOM AND LENGTH ON STRAIGHT ( $H$ ) = APPROXIMATELY  $2D$**

(Clause 1.1)

Suitable for use as stills, mixers without stirring gear, for extraction tanks.

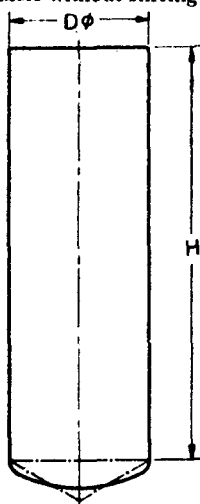


| SL No. | NOMINAL CAPACITY | DIA-METER $D$ | LENGTH ON STRAIGHT $H$ | CYLINDER VOLUME | AGGREGATE, VOLUME |                               |          |                           |
|--------|------------------|---------------|------------------------|-----------------|-------------------|-------------------------------|----------|---------------------------|
|        |                  |               |                        |                 | 30° Conical       | Torispherical, Knuckle Radius |          | Deep Dishd or 45° Conical |
|        |                  |               |                        |                 |                   | 0.06 $D$                      | 0.10 $D$ |                           |
| (1)    | (2)              | (3)           | (4)                    | (5)             | (6)               | (7)                           | (8)      | (9)                       |
|        | litres           | mm            | mm                     | litres          | litres            | litres                        | litres   | litres                    |
| 1      | 10               | 200           | 380                    | 11.7            | 12.3              | 12.3                          | 12.5     | 12.7                      |
| 2      | 25               | 250           | 500                    | 24.5            | 25.6              | 25.8                          | 26.2     | 26.5                      |
| 3      | 40               | 300           | 600                    | 42.6            | 44.6              | 44.9                          | 45.6     | 46.2                      |
| 4      | 63               | 350           | 665                    | 63.8            | 67.0              | 67.4                          | 68.5     | 69.4                      |
| 5      | 100              | 400           | 770                    | 96.2            | 101               | 101                           | 103      | 104                       |
| 6      | 1 000            | 900           | 1 710                  | 1 087           | 1 142             | 1 150                         | 1 168    | 1 182                     |
| 7      | (1 250)          | 900           | 1 880                  | 1 195           | 1 250             | 1 257                         | 1 275    | 1 290                     |
| 8      | 1 600            | 1 000         | 1 950                  | 1 530           | 1 606             | 1 615                         | 1 641    | 1 661                     |
| 9      | 2 000            | 1 100         | 2 100                  | 1 995           | 2 096             | 2 109                         | 2 143    | 2 169                     |
| 10     | 2 500            | 1 200         | 2 280                  | 2 576           | 2 712             | 2 724                         | 2 768    | 2 802                     |
| 11     | (3 200)          | 1 300         | 2 470                  | 3 285           | 3 452             | 3 474                         | 3 529    | 3 573                     |
| 12     | 4 000            | 1 400         | 2 660                  | 4 096           | 4 304             | 4 332                         | 4 400    | 4 455                     |
| 13     | 5 000            | 1 500         | 2 850                  | 5 044           | 5 300             | 5 334                         | 5 418    | 5 486                     |
| 14     | 6 300            | 1 600         | 3 040                  | 6 110           | 6 421             | 6 462                         | 6 565    | 6 646                     |
| 15     | (8 000)          | 1 700         | 3 360                  | 7 627           | 8 000             | 8 049                         | 8 172    | 8 270                     |
| 16     | 10 000           | 1 800         | 3 770                  | 9 575           | 10 018            | 10 076                        | 10 222   | 10 338                    |
| 17     | 12 500           | 2 000         | 3 800                  | 11 922          | 12 540            | 12 613                        | 12 819   | 12 980                    |
| 18     | 16 000           | 2 100         | 4 430                  | 15 327          | 16 031            | 16 122                        | 16 354   | 16 540                    |
| 19     | 20 000           | 2 300         | 4 600                  | 19 090          | 20 135            | 20 014                        | 20 439   | 20 683                    |
| 20     | 25 000           | 2 600         | 4 940                  | 26 231          | 27 567            | 27 741                        | 28 180   | 28 531                    |
| 21     | 32 000           | 2 800         | 5 320                  | 32 771          | 34 440            | 34 656                        | 35 205   | 35 644                    |
| 22     | 40 000           | 3 000         | 5 700                  | 40 299          | 42 350            | 42 618                        | 43 293   | 43 833                    |
| 23     | 50 000           | 3 200         | 6 080                  | 48 883          | 51 373            | 51 627                        | 52 517   | 53 171                    |
| 24     | 63 000           | 3 400         | 6 610                  | 60 018          | 63 005            | 63 393                        | 64 376   | 65 163                    |
| 25     | 80 000           | 3 600         | 7 500                  | 76 500          | 80 046            | 80 507                        | 81 675   | 82 605                    |

**TABLE 13 VERTICAL CYLINDRICAL VESSELS, OPEN OR FLAT TOP, FORMED BOTTOM AND LENGTH ON STRAIGHT ( $H$ ) = APPROXIMATELY  $3D$** 

( Clause 1.1 )

Suitable for use as stills, mixers without stirring gear, for extraction tanks.

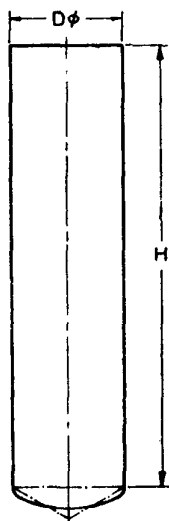


| SL No. | NOMINAL CAPACITY | DIAMETER $D$ | LENGTH ON STRAIGHT $H$ | CYLINDER VOLUME | AGGREGATE VOLUME |                               |               |                            |
|--------|------------------|--------------|------------------------|-----------------|------------------|-------------------------------|---------------|----------------------------|
|        |                  |              |                        |                 | 30° Conical      | Torispherical, Knuckle Radius |               | Deep Dished or 45° Conical |
|        |                  |              |                        |                 |                  | 0.06 $D$                      | 0.10 $D$      |                            |
| (1)    | (2)<br>litres    | (3)<br>mm    | (4)<br>mm              | (5)<br>litres   | (6)<br>litres    | (7)<br>litres                 | (8)<br>litres | (9)<br>litres              |
| 1      | 16               | 200          | 500                    | 15.5            | 16.1             | 16.1                          | 16.3          | 16.5                       |
| 2      | 40               | 250          | 800                    | 39.2            | 40.3             | 40.5                          | 40.6          | 41.2                       |
| 3      | 63               | 300          | 870                    | 61.7            | 63.7             | 64.0                          | 64.7          | 65.2                       |
| 4      | 100              | 350          | 1 010                  | 96.9            | 100              | 100                           | 101           | 102                        |
| 5      | 160              | 400          | 1 250                  | 156             | 160              | 161                           | 163           | 164                        |
| 6      | 250              | 500          | 1 250                  | 245             | 254              | 254                           | 258           | 261                        |
| 7      | (1 250)          | 800          | 2 420                  | 1 214           | 1 253            | 1 258                         | 1 270         | 1 271                      |
| 8      | 1 600            | 900          | 2 450                  | 1 558           | 1 613            | 1 620                         | 1 638         | 1 653                      |
| 9      | 2 000            | 1 000        | 2 500                  | 1 962           | 2 038            | 2 048                         | 2 073         | 2 093                      |
| 10     | 2 500            | 1 000        | 3 100                  | 2 433           | 2 509            | 2 518                         | 2 544         | 2 564                      |
| 11     | (3 200)          | 1 100        | 3 300                  | 3 135           | 3 236            | 3 240                         | 3 283         | 3 309                      |
| 12     | 4 000            | 1 200        | 3 450                  | 3 898           | 4 029            | 4 046                         | 4 090         | 4 124                      |
| 13     | 5 000            | 1 300        | 3 700                  | 4 921           | 5 088            | 5 110                         | 5 165         | 5 209                      |
| 14     | 6 300            | 1 400        | 4 000                  | 6 160           | 6 368            | 6 396                         | 6 464         | 6 519                      |
| 15     | (8 000)          | 1 500        | 4 400                  | 7 788           | 8 044            | 8 078                         | 8 162         | 8 230                      |
| 16     | 10 000           | 1 600        | 4 850                  | 9 748           | 10 059           | 10 100                        | 10 205        | 10 284                     |
| 17     | 12 500           | 1 700        | 5 350                  | 12 144          | 12 517           | 12 566                        | 12 689        | 12 787                     |
| 18     | 16 000           | 1 900        | 5 500                  | 15 620          | 16 141           | 16 209                        | 16 381        | 16 518                     |
| 19     | 20 000           | 2 000        | 6 200                  | 19 468          | 20 076           | 20 155                        | 20 355        | 20 516                     |
| 20     | 25 000           | 2 200        | 6 400                  | 24 320          | 25 129           | 25 234                        | 25 501        | 25 714                     |
| 21     | 32 000           | 2 400        | 6 900                  | 31 188          | 32 239           | 32 376                        | 32 721        | 32 996                     |
| 22     | 40 000           | 2 600        | 7 300                  | 38 763          | 40 099           | 40 273                        | 40 712        | 41 063                     |
| 23     | 50 000           | 2 800        | 7 850                  | 48 356          | 50 025           | 50 241                        | 50 790        | 51 229                     |
| 24     | 63 000           | 3 000        | 8 650                  | 61 155          | 63 207           | 63 474                        | 64 149        | 64 689                     |
| 25     | 80 000           | 3 200        | 9 650                  | 77 586          | 80 076           | 80 400                        | 81 220        | 81 874                     |

**TABLE 14 VERTICAL CYLINDRICAL VESSELS, OPEN OR FLAT TOP, FORMED BOTTOM AND LENGTH ON STRAIGHT (H) = APPROXIMATELY 4D**

( Clause 1.1 )

Suitable for use as stills, mixers without stirring gear, for extraction tanks.



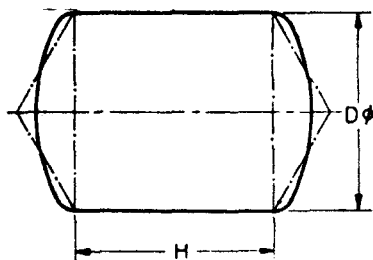
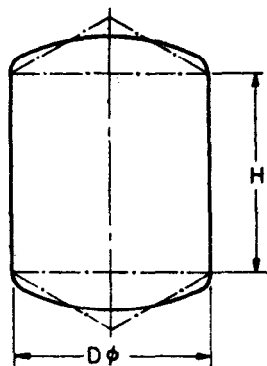
| Sl. No. | NOMINAL CAPACITY | DIAMETER D | LENGTH ON STRAIGHT H | CYLINDER VOLUME | AGGREGATE VOLUME |                               |               |                            |
|---------|------------------|------------|----------------------|-----------------|------------------|-------------------------------|---------------|----------------------------|
|         |                  |            |                      |                 | 30° Conical      | Torispherical, Knuckle Radius |               | Deep Dished or 45° Conical |
|         |                  |            |                      |                 |                  | 0.06D                         | 0.10D         |                            |
| (1)     | (2)<br>litres    | (3)<br>mm  | (4)<br>mm            | (5)<br>litres   | (6)<br>litres    | (7)<br>litres                 | (8)<br>litres | (9)<br>litres              |
| 1       | 10               | 150        | 600                  | 10.2            | 10.4             | 10.4                          | 10.5          | 10.6                       |
| 2       | 25               | 200        | 800                  | 24.8            | 25.4             | 25.4                          | 25.6          | 25.8                       |
| 3       | 40               | 250        | 900                  | 44.1            | 45.2             | 45.4                          | 45.8          | 46.1                       |
| 4       | 100              | 300        | 1 380                | 97.9            | 100              | 100                           | 101           | 101                        |
| 5       | 160              | 350        | 1 640                | 157             | 160              | 161                           | 162           | 163                        |
| 6       | 400              | 500        | 2 000                | 392             | 401              | 402                           | 405           | 408                        |
| 7       | 630              | 600        | 2 200                | 620             | 636              | 639                           | 644           | 648                        |
| 8       | 1 000            | 700        | 2 600                | 991             | 1 017            | 1 020                         | 1 029         | 1 035                      |
| 9       | 1 600            | 800        | 3 150                | 1 581           | 1 620            | 1 625                         | 1 637         | 1 648                      |
| 10      | 2 500            | 900        | 3 850                | 2 448           | 2 503            | 2 510                         | 2 528         | 2 543                      |
| 11      | 3 200            | 1 000      | 4 000                | 3 140           | 3 216            | 3 225                         | 3 251         | 3 271                      |
| 12      | 4 000            | 1 110      | 4 120                | 3 914           | 4 015            | 4 028                         | 4 062         | 4 088                      |
| 13      | 5 000            | 1 200      | 4 350                | 4 915           | 5 046            | 5 063                         | 5 107         | 5 141                      |
| 14      | 6 300            | 1 130      | 4 650                | 6 184           | 6 351            | 6 373                         | 6 428         | 6 472                      |
| 15      | (8 000)          | 1 400      | 5 100                | 7 854           | 8 062            | 8 090                         | 8 158         | 8 213                      |
| 16      | 10 000           | 1 500      | 5 520                | 9 770           | 10 026           | 10 060                        | 10 144        | 10 212                     |
| 17      | 12 500           | 1 600      | 6 100                | 12 261          | 12 572           | 12 613                        | 12 716        | 12 797                     |
| 18      | 16 000           | 1 700      | 6 900                | 15 663          | 16 036           | 16 085                        | 16 208        | 16 306                     |
| 19      | 20 000           | 1 800      | 7 710                | 19 583          | 20 026           | 20 084                        | 20 230        | 20 346                     |
| 20      | 25 000           | 2 000      | 7 800                | 24 492          | 25 100           | 25 179                        | 25 379        | 25 540                     |
| 21      | 32 000           | 2 200      | 8 220                | 31 236          | 32 045           | 32 150                        | 32 417        | 32 630                     |
| 22      | 40 000           | 2 300      | 9 420                | 39 093          | 40 017           | 40 138                        | 40 442        | 40 685                     |
| 23      | 50 000           | 2 600      | 9 200                | 48 852          | 50 188           | 50 362                        | 50 801        | 51 152                     |
| 24      | 63 000           | 2 800      | 10 000               | 61 600          | 63 269           | 63 485                        | 64 034        | 64 473                     |
| 25      | 80 000           | 3 000      | 11 050               | 78 120          | 80 172           | 80 439                        | 81 141        | 81 654                     |



**TABLE 15 VERTICAL OR HORIZONTAL CYLINDRICAL VESSELS WITH FORMED ENDS AND LENGTH ON STRAIGHT (H) = APPROXIMATELY D**

(Clause 1.1)

Suitable for use as stills, reaction vessels, tanks, driers for extraction, etc.

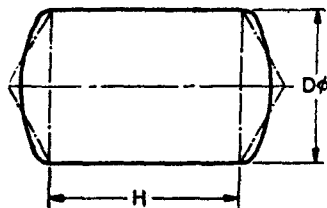
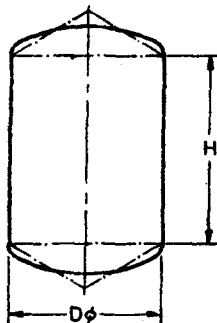


| Sl. No. | NOMINAL CAPACITY | DIAMETER D | LENGTH ON STRAIGHT H | CYLINDER VOLUME | AGGREGATE VOLUME |                               |               |                           |
|---------|------------------|------------|----------------------|-----------------|------------------|-------------------------------|---------------|---------------------------|
|         |                  |            |                      |                 | 30° Conical      | Torispherical, Knuckle Radius |               | Deep Dishd or 45° Conical |
|         |                  |            |                      |                 |                  | 0.06D                         | 0.10D         |                           |
| (1)     | (2)<br>litres    | (3)<br>mm  | (4)<br>mm            | (5)<br>litres   | (6)<br>litres    | (7)<br>litres                 | (8)<br>litres | (9)<br>litres             |
| 1       | 10               | 250        | 200                  | 9.8             | 12.1             | 12.4                          | 13.2          | 13.9                      |
| 2       | 16               | 250        | 300                  | 14.7            | 17.0             | 17.3                          | 18.1          | 18.8                      |
| 3       | 25               | 300        | 300                  | 21.3            | 25.4             | 25.9                          | 27.3          | 28.3                      |
| 4       | 40               | 350        | 350                  | 33.6            | 40.1             | 40.9                          | 43.1          | 44.8                      |
| 5       | 63               | 400        | 430                  | 53.7            | 63.4             | 64.7                          | 67.7          | 70.4                      |
| 6       | 100              | 500        | 420                  | 82.3            | 101              | 103                           | 110           | 115                       |
| 7       | 160              | 600        | 480                  | 135             | 167              | 172                           | 183           | 191                       |
| 8       | 250              | 700        | 550                  | 211             | 263              | 269                           | 287           | 300                       |
| 9       | 400              | 800        | 650                  | 326             | 403              | 414                           | 439           | 460                       |
| 10      | 630              | 900        | 850                  | 540             | 650              | 665                           | 701           | 730                       |
| 11      | 1 000            | 1 000      | 1 100                | 863             | 1 015            | 1 034                         | 1 085         | 1 125                     |
| 12      | (1 250)          | 1 100      | 1 110                | 1 054           | 1 256            | 1 282                         | 1 350         | 1 402                     |
| 13      | 1 600            | 1 200      | 1 200                | 1 356           | 1 618            | 1 652                         | 1 740         | 1 808                     |
| 14      | 2 000            | 1 300      | 1 300                | 1 729           | 2 063            | 2 107                         | 2 217         | 2 305                     |
| 15      | 2 500            | 1 400      | 1 400                | 2 156           | 2 572            | 2 628                         | 2 764         | 2 874                     |
| 16      | (3 200)          | 1 500      | 1 550                | 2 743           | 3 255            | 3 323                         | 3 491         | 3 627                     |
| 17      | 4 000            | 1 600      | 1 700                | 3 417           | 4 039            | 4 121                         | 4 327         | 4 489                     |
| 18      | 5 000            | 1 700      | 1 900                | 4 313           | 5 059            | 5 157                         | 5 403         | 5 599                     |
| 19      | 6 300            | 1 900      | 1 900                | 5 396           | 6 438            | 6 574                         | 6 918         | 7 192                     |
| 20      | (8 000)          | 2 000      | 2 200                | 6 908           | 8 124            | 8 282                         | 8 682         | 9 004                     |
| 21      | 10 000           | 2 200      | 2 220                | 8 436           | 10 054           | 10 264                        | 10 798        | 11 224                    |
| 22      | 12 500           | 2 400      | 2 320                | 10 486          | 12 588           | 12 862                        | 13 552        | 14 102                    |
| 23      | 16 000           | 2 600      | 2 550                | 13 540          | 16 212           | 16 560                        | 17 438        | 18 140                    |
| 24      | 20 000           | 2 800      | 2 750                | 16 940          | 20 278           | 20 710                        | 21 808        | 22 686                    |
| 25      | 25 000           | 3 000      | 3 000                | 21 210          | 25 314           | 25 848                        | 27 198        | 28 278                    |
| 26      | 32 000           | 3 200      | 3 400                | 27 336          | 32 316           | 32 964                        | 34 604        | 35 912                    |
| 27      | 40 000           | 3 400      | 3 760                | 34 140          | 40 114           | 40 800                        | 42 856        | 44 430                    |
| 28      | 50 000           | 3 800      | 3 700                | 41 810          | 50 152           | 51 236                        | 53 980        | 56 176                    |
| 29      | 63 000           | 4 000      | 4 250                | 53 550          | 63 280           | 64 542                        | 67 746        | 70 300                    |
| 30      | 80 000           | 4 500      | 4 200                | 66 780          | 80 630           | 82 430                        | 86 980        | 90 640                    |

**TABLE 16 VERTICAL OR HORIZONTAL CYLINDRICAL VESSELS  
WITH FORMED ENDS AND LENGTH ON STRAIGHT  
(H) = APPROXIMATELY 1.25 D**

( Clause 1.1 )

Suitable for use as stills, reaction vessels, tanks, driers for extraction, etc.

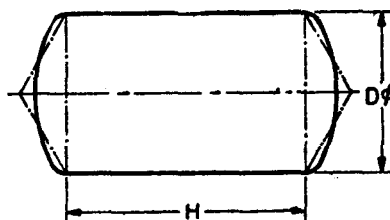
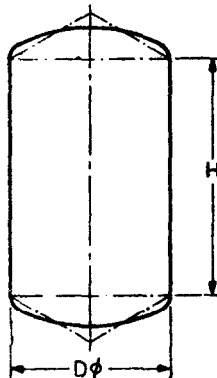


| Sl.<br>No. | NOMINAL<br>CAPACITY | DIAMETER<br>D | LENGTH<br>ON<br>STRAIGHT<br>H | CYLINDER<br>VOLUME | AGGREGATE VOLUME |                                  |               |                                     |
|------------|---------------------|---------------|-------------------------------|--------------------|------------------|----------------------------------|---------------|-------------------------------------|
|            |                     |               |                               |                    | 30°<br>Conical   | Torispherical,<br>Knuckle Radius |               | Deep<br>Dished<br>or 45°<br>Conical |
|            |                     |               |                               |                    |                  | 0.06D                            | 0.10D         |                                     |
| (1)        | (2)<br>litres       | (3)<br>mm     | (4)<br>mm                     | (5)<br>litres      | (6)<br>litres    | (7)<br>litres                    | (8)<br>litres | (9)<br>litres                       |
| 1          | 250                 | 600           | 775                           | 218                | 251              | 255                              | 266           | 275                                 |
| 2          | 400                 | 700           | 910                           | 350                | 402              | 409                              | 426           | 440                                 |
| 3          | 630                 | 800           | 1 100                         | 552                | 630              | 640                              | 665           | 686                                 |
| 4          | 1 600               | 1 100         | 1 475                         | 1 401              | 1 603            | 1 629                            | 1 697         | 1 749                               |
| 5          | 2 000               | 1 200         | 1 540                         | 1 740              | 2 002            | 2 036                            | 2 124         | 2 192                               |
| 6          | 2 500               | 1 300         | 1 630                         | 2 167              | 2 501            | 2 545                            | 2 655         | 2 743                               |
| 7          | 3 200               | 1 400         | 1 810                         | 2 787              | 3 203            | 3 259                            | 3 395         | 3 505                               |
| 8          | 4 000               | 1 500         | 1 975                         | 3 495              | 4 007            | 4 075                            | 4 243         | 4 379                               |
| 9          | 5 000               | 1 600         | 2 180                         | 4 381              | 5 003            | 5 085                            | 5 291         | 5 453                               |
| 10         | 6 300               | 1 800         | 2 140                         | 5 435              | 6 321            | 6 437                            | 6 729         | 6 961                               |
| 11         | 8 000               | 1 900         | 2 450                         | 6 958              | 8 000            | 8 136                            | 8 480         | 8 754                               |
| 12         | 10 000              | 2 100         | 2 490                         | 8 615              | 10 023           | 10 405                           | 10 669        | 11 407                              |
| 13         | 12 500              | 2 200         | 2 870                         | 10 906             | 12 524           | 12 734                           | 13 268        | 13 694                              |
| 14         | 16 000              | 2 400         | 3 075                         | 13 899             | 16 001           | 16 275                           | 16 965        | 17 515                              |
| 15         | 20 000              | 2 600         | 3 265                         | 17 337             | 20 009           | 20 357                           | 21 235        | 21 937                              |
| 16         | 25 000              | 2 800         | 3 520                         | 21 683             | 25 021           | 25 453                           | 26 551        | 27 429                              |
| 17         | 32 000              | 3 000         | 3 950                         | 27 926             | 32 030           | 32 564                           | 33 914        | 34 994                              |
| 18         | 40 000              | 3 200         | 4 360                         | 35 054             | 40 034           | 40 602                           | 42 242        | 43 550                              |
| 19         | 50 000              | 3 600         | 4 210                         | 42 942             | 50 034           | 50 956                           | 53 292        | 55 252                              |
| 20         | 63 000              | 3 800         | 4 840                         | 54 692             | 63 034           | 64 118                           | 66 862        | 69 054                              |

**TABLE 17 VERTICAL OR HORIZONTAL CYLINDRICAL VESSELS  
WITH FORMED ENDS AND LENGTH ON STRAIGHT**  
( $H$ ) = APPROXIMATELY  $1.5D$

(Clause 1.1)

Suitable for use as stills, reaction vessels, tanks, driers for extraction, etc.

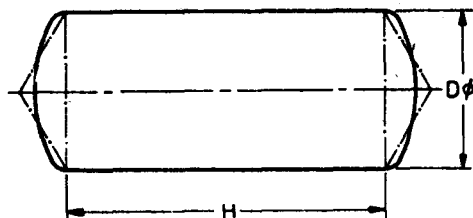
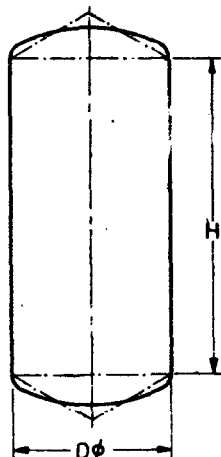


| SL<br>No. | NOMINAL<br>CAPACITY | DIAMETER<br>$D$ | LENGTH<br>ON<br>STRAIGHT<br>$H$ | CYLINDER<br>VOLUME | AGGREGATE VOLUME |                                  |               |                                     |
|-----------|---------------------|-----------------|---------------------------------|--------------------|------------------|----------------------------------|---------------|-------------------------------------|
|           |                     |                 |                                 |                    | 30°<br>Conical   | Torispherical,<br>Knuckle Radius |               | Deep<br>Dished<br>or 45°<br>Conical |
|           |                     |                 |                                 |                    |                  | 0.06 $D$                         | 0.10 $D$      |                                     |
| (1)       | (2)<br>litres       | (3)<br>mm       | (4)<br>mm                       | (5)<br>litres      | (6)<br>litres    | (7)<br>litres                    | (8)<br>litres | (9)<br>litres                       |
| 1         | 10                  | 200             | 300                             | 9.3                | 10.5             | 10.6                             | 11.0          | 11.4                                |
| 2         | 40                  | 300             | 500                             | 35.5               | 39.6             | 40.1                             | 41.4          | 42.5                                |
| 3         | 63                  | 350             | 590                             | 55.6               | 63.1             | 64.0                             | 66.1          | 67.8                                |
| 4         | 160                 | 500             | 725                             | 141                | 161              | 163                              | 169           | 174                                 |
| 5         | 630                 | 800             | 1 110                           | 557                | 635              | 645                              | 670           | 691                                 |
| 6         | 1 000               | 900             | 1 400                           | 890                | 1 000            | 1 015                            | 1 050         | 1 080                               |
| 7         | (1 250)             | 1 000           | 1 400                           | 1 099              | 1 251            | 1 269                            | 1 321         | 1 361                               |
| 8         | 1 600               | 1 100           | 1 500                           | 1 425              | 1 627            | 1 653                            | 1 721         | 1 773                               |
| 9         | 2 500               | 1 200           | 2 000                           | 2 260              | 2 522            | 2 556                            | 2 644         | 2 712                               |
| 10        | (3 200)             | 1 400           | 1 900                           | 2 926              | 3 343            | 3 398                            | 3 534         | 3 644                               |
| 11        | 4 000               | 1 500           | 2 000                           | 3 540              | 4 052            | 4 120                            | 4 282         | 4 424                               |
| 12        | 5 000               | 1 600           | 2 200                           | 4 422              | 5 044            | 5 126                            | 5 332         | 5 494                               |
| 13        | 6 300               | 1 700           | 2 500                           | 5 675              | 6 421            | 6 519                            | 6 765         | 6 961                               |
| 14        | (8 000)             | 1 800           | 2 750                           | 7 239              | 8 125            | 8 242                            | 8 533         | 8 765                               |
| 15        | 10 000              | 2 000           | 2 850                           | 8 949              | 10 165           | 10 323                           | 10 723        | 11 045                              |
| 16        | 12 500              | 2 100           | 3 250                           | 11 245             | 12 653           | 12 835                           | 13 299        | 13 671                              |
| 17        | 16 000              | 2 300           | 3 450                           | 14 317             | 16 165           | 16 407                           | 17 015        | 17 501                              |
| 18        | 20 000              | 2 400           | 4 000                           | 18 080             | 20 182           | 20 456                           | 21 146        | 21 696                              |
| 19        | 25 000              | 2 600           | 4 250                           | 22 567             | 25 239           | 25 587                           | 26 565        | 27 167                              |
| 20        | 32 000              | 2 800           | 4 660                           | 28 705             | 32 043           | 32 475                           | 33 573        | 34 451                              |
| 21        | 50 000              | 3 400           | 4 850                           | 44 038             | 50 012           | 50 788                           | 52 754        | 54 322                              |
| 22        | 63 000              | 3 600           | 5 500                           | 56 100             | 63 192           | 64 114                           | 66 450        | 68 310                              |
| 23        | 80 000              | 4 000           | 5 600                           | 70 560             | 80 290           | 81 552                           | 84 756        | 87 310                              |

**TABLE 18 VERTICAL OR HORIZONTAL CYLINDRICAL VESSELS WITH FORMED ENDS AND LENGTH ON STRAIGHT**  
**(H) = APPROXIMATELY 2D**

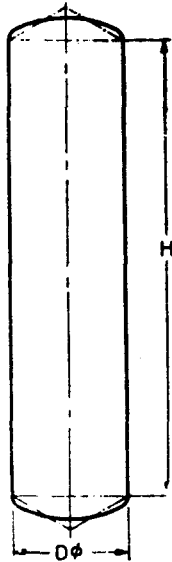
(Clause 1.1)

Suitable for use as stills, reaction vessels, tanks, driers for extraction, etc.

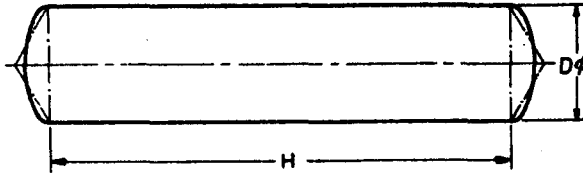


| Sl. No. | NOMINAL CAPACITY | DIAMETER D | LENGTH ON STRAIGHT H | CYLINDER VOLUME | AGGREGATE VOLUME |                               |            |                          |
|---------|------------------|------------|----------------------|-----------------|------------------|-------------------------------|------------|--------------------------|
|         |                  |            |                      |                 | 30° Conical      | Torispherical, Knuckle Radius |            | Deep Dish or 45° Conical |
|         |                  |            |                      |                 |                  | 0.06D                         | 0.10D      |                          |
| (1)     | (2) litres       | (3) mm     | (4) mm               | (5) litres      | (6) litres       | (7) litres                    | (8) litres | (9) litres               |
| 1       | 10               | 200        | 370                  | 11.4            | 12.6             | 12.8                          | 13.2       | 13.8                     |
| 2       | 25               | 250        | 500                  | 24.5            | 26.8             | 27.1                          | 27.9       | 28.6                     |
| 3       | 40               | 300        | 550                  | 39.0            | 43.0             | 43.6                          | 45.0       | 46.1                     |
| 4       | 63               | 350        | 650                  | 62.4            | 68.9             | 69.7                          | 71.9       | 73.6                     |
| 5       | 100              | 400        | 750                  | 93.7            | 103              | 104                           | 107        | 111                      |
| 6       | 250              | 500        | 1 200                | 235             | 254              | 256                           | 263        | 268                      |
| 7       | 400              | 600        | 1 310                | 369             | 401              | 406                           | 417        | 425                      |
| 8       | 630              | 700        | 1 510                | 581             | 633.5            | 640                           | 657        | 671                      |
| 9       | 1 000            | 800        | 1 850                | 928             | 1 006            | 1 016                         | 1 042      | 1 062                    |
| 10      | (1 250)          | 900        | 1 800                | 1 144           | 1 255            | 1 269                         | 1 306      | 1 335                    |
| 11      | 1 600            | 1 000      | 1 850                | 1 452           | 1 604            | 1 623                         | 1 674      | 1 714                    |
| 12      | 2 000            | 1 100      | 1 930                | 1 833           | 2 035            | 2 061                         | 2 129      | 2 181                    |
| 13      | 2 500            | 1 100      | 2 440                | 2 318           | 2 520            | 2 546                         | 2 614      | 2 666                    |
| 14      | (3 200)          | 1 200      | 2 600                | 2 938           | 3 200            | 3 234                         | 3 322      | 3 390                    |
| 15      | 4 000            | 1 300      | 2 760                | 3 670           | 4 004            | 4 048                         | 4 158      | 4 246                    |
| 16      | 5 000            | 1 400      | 3 000                | 4 620           | 5 036            | 5 092                         | 5 228      | 5 338                    |
| 17      | 6 300            | 1 500      | 3 280                | 5 805           | 6 317            | 6 385                         | 6 553      | 6 689                    |
| 18      | (8 000)          | 1 700      | 3 200                | 7 264           | 8 010            | 8 108                         | 8 354      | 8 550                    |
| 19      | 10 000           | 1 800      | 3 600                | 9 144           | 10 030           | 10 146                        | 10 438     | 10 670                   |
| 20      | 12 500           | 1 900      | 4 050                | 11 502          | 12 544           | 12 680                        | 13 024     | 13 298                   |
| 21      | 16 000           | 2 100      | 4 230                | 14 635          | 16 043           | 16 225                        | 16 689     | 17 061                   |
| 22      | 20 000           | 2 300      | 4 400                | 18 260          | 20 108           | 20 350                        | 20 958     | 21 444                   |
| 23      | 25 000           | 2 400      | 5 100                | 23 052          | 25 154           | 25 428                        | 26 118     | 26 668                   |
| 24      | 32 000           | 2 600      | 5 550                | 29 470          | 32 142           | 32 490                        | 33 368     | 34 070                   |
| 25      | 40 000           | 2 800      | 5 960                | 36 713          | 40 051           | 40 483                        | 41 581     | 42 459                   |
| 26      | 50 000           | 3 200      | 5 600                | 45 024          | 50 004           | 50 652                        | 52 292     | 53 600                   |
| 27      | 63 000           | 3 400      | 6 300                | 57 204          | 63 178           | 63 954                        | 65 920     | 67 488                   |
| 28      | 80 000           | 3 600      | 7 150                | 72 930          | 80 022           | 80 944                        | 83 280     | 85 140                   |

**TABLE 19 VERTICAL OR HORIZONTAL CYLINDRICAL VESSELS  
WITH FORMED ENDS AND LENGTH ON STRAIGHT**  
(H) = APPROXIMATELY 3D  
(Clause 1.1)



Suitable for use as stills, reaction vessels,  
tanks, driers for extraction, etc.

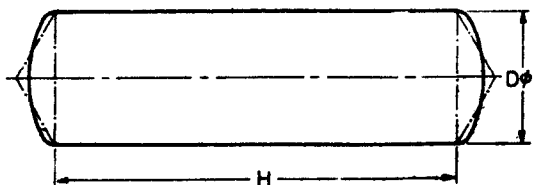
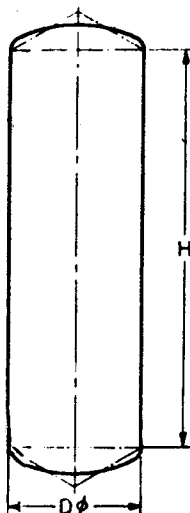


| Sl.<br>No. | NOMINAL<br>CAPACITY | DIAMETER<br>D | LENGTH<br>ON<br>STRAIGHT<br>H | CYLINDER<br>VOLUME | AGGREGATE VOLUME |                                  |               |                                     |
|------------|---------------------|---------------|-------------------------------|--------------------|------------------|----------------------------------|---------------|-------------------------------------|
|            |                     |               |                               |                    | 30°<br>Conical   | Torispherical,<br>Knuckle Radius |               | Deep<br>Dished<br>or 45°<br>Conical |
|            |                     |               |                               |                    |                  | 0.06D                            | 0.10D         |                                     |
| (1)        | (2)<br>litres       | (3)<br>mm     | (4)<br>mm                     | (5)<br>litres      | (6)<br>litres    | (7)<br>litres                    | (8)<br>litres | (9)<br>litres                       |
| 1          | 16                  | 200           | 500                           | 15.5               | 16.7             | 16.8                             | 17.2          | 17.6                                |
| 2          | 40                  | 250           | 770                           | 37.7               | 40.1             | 40.4                             | 41.1          | 41.8                                |
| 3          | 63                  | 300           | 850                           | 60.3               | 64.4             | 64.9                             | 66.3          | 67.4                                |
| 4          | 100                 | 350           | 1 000                         | 96                 | 102              | 103                              | 104           | 107                                 |
| 5          | 160                 | 400           | 1 210                         | 151                | 160              | 162                              | 165           | 168                                 |
| 6          | 250                 | 500           | 1 250                         | 245                | 264              | 266                              | 272           | 277                                 |
| 7          | 1 250               | 800           | 2 350                         | 1 179              | 1 257            | 1 267                            | 1 293         | 1 313                               |
| 8          | 1 900               | 900           | 2 400                         | 1 526              | 1 637            | 1 651                            | 1 687         | 1 717                               |
| 9          | 2 000               | 900           | 2 980                         | 1 895              | 2 006            | 2 020                            | 2 056         | 2 085                               |
| 10         | 2 500               | 1 000         | 3 000                         | 2 355              | 2 507            | 2 526                            | 2 577         | 2 617                               |
| 11         | (3 250)             | 1 100         | 3 250                         | 3 087              | 3 289            | 3 315                            | 3 435         | 3 383                               |
| 12         | 4 000               | 1 200         | 3 350                         | 3 785              | 4 047            | 4 081                            | 4 237         | 4 169                               |
| 13         | 5 000               | 1 300         | 3 550                         | 4 721              | 5 055            | 5 099                            | 5 297         | 5 209                               |
| 14         | 6 300               | 1 400         | 3 850                         | 5 925              | 6 345            | 6 401                            | 6 647         | 6 537                               |
| 15         | (8 000)             | 1 500         | 4 250                         | 7 522              | 8 034            | 8 102                            | 8 406         | 8 270                               |
| 16         | 10 000              | 1 600         | 4 700                         | 9 447              | 10 069           | 10 151                           | 10 519        | 10 357                              |
| 17         | 12 500              | 1 700         | 5 200                         | 11 804             | 12 550           | 11 648                           | 13 090        | 12 894                              |
| 18         | 16 000              | 1 900         | 5 300                         | 15 052             | 16 094           | 16 230                           | 16 848        | 16 574                              |
| 19         | 20 000              | 2 000         | 6 000                         | 18 840             | 20 056           | 20 214                           | 20 936        | 20 614                              |
| 20         | 25 000              | 2 200         | 6 200                         | 23 560             | 25 178           | 25 348                           | 26 348        | 25 922                              |
| 21         | 32 000              | 2 300         | 7 300                         | 30 295             | 32 143           | 32 385                           | 33 479        | 32 993                              |
| 22         | 40 000              | 2 600         | 7 050                         | 37 430             | 40 102           | 40 450                           | 42 030        | 41 328                              |
| 23         | 50 000              | 2 800         | 7 600                         | 46 816             | 50 154           | 50 586                           | 52 562        | 51 684                              |
| 24         | 63 000              | 3 000         | 8 400                         | 59 388             | 63 492           | 64 026                           | 66 456        | 65 376                              |
| 25         | 80 000              | 3 200         | 9 400                         | 75 576             | 80 556           | 81 204                           | 84 152        | 82 844                              |

**TABLE 20 VERTICAL OR HORIZONTAL CYLINDRICAL VESSELS  
WITH FORMED ENDS AND LENGTH ON STRAIGHT**  
( $H$ ) = APPROXIMATELY  $4D$

(Clause 1.1)

Suitable for use as stills, reaction vessels, tanks, driers for extraction, etc.

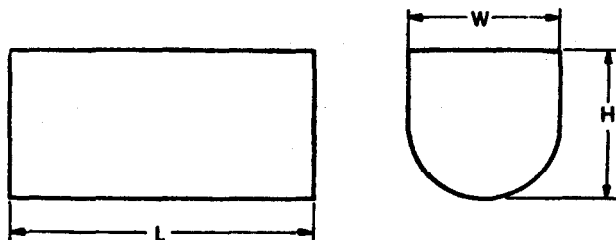


| Sl.<br>No. | NOMINAL<br>CAPACITY | DIAMETER<br>$D$ | LENGTH<br>ON<br>STRAIGHT<br>$H$ | CYLINDER<br>VOLUME | AGGREGATE VOLUME |                                  |               |                                     |
|------------|---------------------|-----------------|---------------------------------|--------------------|------------------|----------------------------------|---------------|-------------------------------------|
|            |                     |                 |                                 |                    | 30°<br>Conical   | Torispherical,<br>Knuckle Radius |               | Deep<br>Dished<br>or 45°<br>Conical |
|            |                     |                 |                                 |                    |                  | 0.06 $D$                         | 0.10 $D$      |                                     |
| (1)        | (2)<br>litres       | (3)<br>mm       | (4)<br>mm                       | (5)<br>litres      | (6)<br>litres    | (7)<br>litres                    | (8)<br>litres | (9)<br>litres                       |
| 1          | 10                  | 150             | 600                             | 10.2               | 10.7             | 10.7                             | 10.9          | 11.0                                |
| 2          | 25                  | 200             | 800                             | 24.8               | 26               | 26.1                             | 26.5          | 26.9                                |
| 3          | 40                  | 250             | 900                             | 44.1               | 46.4             | 46.5                             | 47.5          | 48.2                                |
| 4          | 100                 | 300             | 1 380                           | 97.9               | 102              | 102                              | 103           | 105                                 |
| 5          | 400                 | 500             | 2 000                           | 392                | 411              | 413                              | 419           | 424                                 |
| 6          | 630                 | 600             | 2 200                           | 620                | 653              | 657                              | 668           | 677                                 |
| 7          | 1 000               | 700             | 2 600                           | 1 001              | 1 053            | 1 059                            | 1 077         | 1 090                               |
| 8          | (1 250)             | 700             | 3 120                           | 1 201              | 1 253            | 1 260                            | 1 277         | 1 291                               |
| 9          | 1 600               | 800             | 3 100                           | 1 556              | 1 634            | 1 636                            | 1 669         | 1 690                               |
| 10         | (3 200)             | 1 000           | 3 900                           | 3 061              | 3 213            | 3 233                            | 3 283         | 3 323                               |
| 11         | 4 000               | 1 100           | 4 000                           | 3 800              | 4 002            | 4 028                            | 4 096         | 4 148                               |
| 12         | 5 000               | 1 200           | 4 250                           | 4 802              | 5 064            | 5 098                            | 5 186         | 5 254                               |
| 13         | (8 000)             | 1 400           | 5 000                           | 7 700              | 8 116            | 8 172                            | 8 308         | 8 418                               |
| 14         | 10 000              | 1 500           | 5 490                           | 9 558              | 10 070           | 10 138                           | 10 306        | 10 442                              |
| 15         | 12 500              | 1 600           | 6 000                           | 12 060             | 12 682           | 12 764                           | 12 970        | 13 132                              |
| 16         | 16 000              | 1 700           | 6 800                           | 15 436             | 16 182           | 16 280                           | 16 526        | 16 722                              |
| 17         | 20 000              | 1 800           | 7 600                           | 19 304             | 20 190           | 20 306                           | 20 598        | 20 830                              |
| 18         | 25 000              | 2 000           | 7 600                           | 23 864             | 25 080           | 25 238                           | 25 638        | 25 960                              |
| 19         | 32 000              | 2 100           | 8 850                           | 30 621             | 32 029           | 32 211                           | 32 675        | 33 047                              |
| 20         | 40 000              | 2 300           | 9 200                           | 38 180             | 40 028           | 40 270                           | 40 878        | 41 364                              |
| 21         | 50 000              | 2 400           | 10 600                          | 47 912             | 50 014           | 50 288                           | 50 978        | 51 528                              |
| 22         | 63 000              | 2 600           | 11 400                          | 60 534             | 63 206           | 63 554                           | 64 382        | 65 134                              |
| 23         | 80 000              | 2 800           | 12 500                          | 77 000             | 80 338           | 80 770                           | 81 868        | 82 746                              |

**TABLE 21 'U' SHAPED PANS OPEN OR FLAT TOP,  
SEMICIRCULAR BOTTOM AND LENGTH  
( $L$ ) = APPROXIMATELY  $2W$**

(Clause 1.1)

Suitable for use as crystallisers, powder mixers and driers.

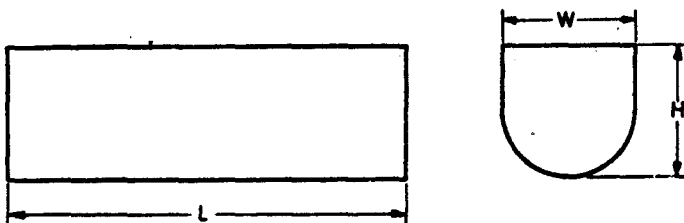


| SL<br>No. | NOMINAL<br>CAPACITY | WIDTH<br>$W$ | HEIGHT<br>$H$ | LENGTH<br>$L$ | AGGREGATE<br>VOLUME |
|-----------|---------------------|--------------|---------------|---------------|---------------------|
| (1)       | (2)<br>litres       | (3)<br>mm    | (4)<br>mm     | (5)<br>mm     | (6)<br>litres       |
| 1         | 10                  | 200          | 200           | 350           | 12.6                |
| 2         | 16                  | 200          | 200           | 450           | 16.2                |
| 3         | 25                  | 250          | 250           | 500           | 28.0                |
| 4         | 40                  | 300          | 300           | 550           | 44.5                |
| 5         | 63                  | 350          | 350           | 650           | 70.8                |
| 6         | 100                 | 400          | 400           | 750           | 107                 |
| 7         | 160                 | 500          | 500           | 800           | 178                 |
| 8         | 250                 | 500          | 500           | 1 200         | 267                 |
| 9         | 400                 | 600          | 600           | 1 300         | 417                 |
| 10        | 630                 | 700          | 700           | 1 450         | 635                 |
| 11        | 1 000               | 800          | 800           | 1 800         | 1 028               |
| 12        | (1 250)             | 900          | 900           | 1 800         | 1 301               |
| 13        | 1 600               | 1 000        | 1 000         | 1 850         | 1 652               |
| 14        | 2 000               | 1 100        | 1 100         | 2 000         | 2 160               |
| 15        | 2 500               | 1 100        | 1 100         | 2 400         | 2 592               |
| 16        | (3 200)             | 1 200        | 1 200         | 2 500         | 3 225               |
| 17        | 4 000               | 1 300        | 1 300         | 2 700         | 4 077               |
| 18        | 5 000               | 1 400        | 1 400         | 2 900         | 5 075               |
| 19        | 6 300               | 1 500        | 1 500         | 3 150         | 6 331               |
| 20        | (8 000)             | 1 600        | 1 600         | 3 550         | 8 094               |
| 21        | 10 000              | 1 800        | 1 800         | 3 600         | 10 404              |
| 22        | 12 500              | 1 900        | 1 900         | 3 900         | 12 558              |
| 23        | 16 000              | 2 100        | 2 100         | 4 200         | 16 506              |
| 24        | 20 000              | 2 200        | 2 200         | 4 700         | 20 304              |
| 25        | 25 000              | 2 400        | 2 400         | 5 000         | 25 700              |
| 26        | 32 000              | 2 600        | 2 600         | 5 400         | 32 562              |
| 27        | 40 000              | 2 800        | 2 800         | 5 800         | 40 600              |
| 28        | 50 000              | 3 000        | 3 000         | 6 300         | 50 589              |
| 29        | 63 000              | 3 200        | 3 200         | 7 000         | 63 980              |
| 30        | 80 000              | 3 600        | 3 600         | 7 000         | 80 500              |

**TABLE 22 'U' SHAPED PANS OPEN OR FLAT TOP,  
SEMICIRCULAR BOTTOM AND LENGTH  
(L) = APPROXIMATELY 3 W**

( Clause 1.1 )

Suitable for use as crystallisers, powder mixers and driers.



| Sl. No. | NOMINAL CAPACITY | WIDTH<br>W | HEIGHT<br>H | LENGTH<br>L | AGGREGATE VOLUME |
|---------|------------------|------------|-------------|-------------|------------------|
| (1)     | (2)<br>litres    | (3)<br>mm  | (4)<br>mm   | (5)<br>mm   | (6)<br>litres    |
| 1       | 10               | 150        | 150         | 500         | 10.0             |
| 2       | 16               | 200        | 200         | 500         | 18.0             |
| 3       | 25               | 200        | 200         | 700         | 25.2             |
| 4       | 40               | 250        | 250         | 750         | 42.0             |
| 5       | 63               | 300        | 300         | 800         | 64.8             |
| 6       | 100              | 350        | 350         | 1 000       | 109              |
| 7       | 160              | 400        | 400         | 1 200       | 171              |
| 8       | 400              | 500        | 500         | 1 800       | 401              |
| 9       | 630              | 600        | 600         | 2 000       | 642              |
| 10      | 1 000            | 700        | 700         | 2 300       | 1 007            |
| 11      | (1 250)          | 800        | 800         | 2 300       | 1 313            |
| 12      | 1 600            | 900        | 900         | 2 300       | 1 663            |
| 13      | 2 000            | 900        | 900         | 2 800       | 2 024            |
| 14      | 2 500            | 1 000      | 1 000       | 2 900       | 2 589            |
| 15      | (3 200)          | 1 100      | 1 100       | 3 100       | 3 348            |
| 16      | 4 000            | 1 200      | 1 200       | 3 200       | 4 128            |
| 17      | 5 000            | 1 200      | 1 200       | 4 000       | 5 160            |
| 18      | 6 300            | 1 300      | 1 300       | 4 250       | 6 417            |
| 19      | (8 000)          | 1 400      | 1 400       | 4 600       | 8 050            |
| 20      | 10 000           | 1 500      | 1 500       | 5 000       | 10 050           |
| 21      | 12 500           | 1 600      | 1 700       | 5 500       | 12 540           |
| 22      | 16 000           | 1 800      | 1 800       | 5 600       | 16 184           |
| 23      | 20 000           | 1 900      | 1 900       | 6 250       | 20 145           |
| 24      | 25 000           | 2 100      | 2 100       | 6 400       | 25 153           |
| 25      | 32 000           | 2 300      | 2 300       | 6 900       | 32 568           |
| 26      | 40 000           | 2 400      | 2 400       | 7 800       | 40 092           |
| 27      | 50 000           | 2 600      | 2 600       | 8 000       | 50 049           |
| 28      | 63 000           | 2 800      | 2 800       | 9 000       | 63 000           |
| 29      | 80 000           | 3 000      | 3 000       | 10 000      | 80 000           |



# APPENDIX A

## ( Clause 0.5 )

### CYLINDRICAL SHELLS

| NOMINAL<br>DIAMETER<br><i>D</i> | CIRCUM-<br>FERENCE | CROSS-<br>SECTION     | VOLUME<br>CAPA-<br>CITY/m<br>HEIGHT | SUR-<br>FACE/m<br>HEIGHT | WEIGHT OF MATERIAL PER<br>METRE HEIGHT PER MILLIMETRE<br>MATERIAL THICKNESS |           |                |
|---------------------------------|--------------------|-----------------------|-------------------------------------|--------------------------|---|-----------|----------------|
|                                 |                    |                       |                                     |                          | Ferrous<br>Material   | Copper    | Alumi-<br>nium |
| (1)<br>mm                       | (2)<br>mm          | (3)<br>m <sup>2</sup> | (4)<br>litres                       | (5)<br>m <sup>2</sup>    | (6)<br>kg   | (7)<br>kg | (8)<br>kg      |
| 100                             | 314                | 0.008                 | 7.9                                 | 0.314                    | 2.51  | 2.80      | 0.848          |
| 125                             | 393                | 0.012                 | 12                                  | 0.393                    | 3.14  | 3.51      | 1.06           |
| 150                             | 471                | 0.017                 | 17                                  | 0.471                    | 3.77  | 4.21      | 1.27           |
| 200                             | 628                | 0.031                 | 31                                  | 0.628                    | 5.02  | 5.61      | 1.70           |
| 250                             | 785                | 0.049                 | 49                                  | 0.785                    | 6.28  | 7.01      | 2.12           |
| 300                             | 942                | 0.071                 | 71                                  | 0.942                    | 7.54  | 8.41      | 2.54           |
| (350)                           | 1 100              | 0.096                 | 96                                  | 1.10                     | 8.80  | 9.82      | 2.97           |
| 400                             | 1 257              | 0.125                 | 125                                 | 1.26                     | 10.1  | 11.3      | 3.40           |
| 500                             | 1 571              | 0.196                 | 196                                 | 1.57                     | 12.5  | 14.0      | 4.24           |
| 600                             | 1 885              | 0.282                 | 282                                 | 1.89                     | 15.1  | 16.9      | 5.10           |
| 700                             | 2 199              | 0.385                 | 385                                 | 2.20                     | 17.6  | 19.6      | 5.94           |
| 800                             | 2 513              | 0.502                 | 502                                 | 2.51                     | 20.1  | 22.4      | 6.78           |
| 900                             | 2 827              | 0.636                 | 636                                 | 2.83                     | 22.6  | 25.3      | 7.64           |
| 1 000                           | 3 142              | 0.785                 | 785                                 | 3.14                     | 25.1  | 28.0      | 8.48           |
| 1 100                           | 3 456              | 0.950                 | 950                                 | 3.46                     | 27.7  | 30.9      | 9.34           |
| 1 200                           | 3 770              | 1.13                  | 1 130                               | 3.77                     | 30.2  | 33.7      | 10.2           |
| (1 300)                         | 4 084              | 1.33                  | 1 330                               | 4.08                     | 32.6  | 36.4      | 11.0           |
| 1 400                           | 4 398              | 1.54                  | 1 540                               | 4.40                     | 35.2  | 39.3      | 11.9           |
| (1 500)                         | 4 712              | 1.77                  | 1 770                               | 4.71                     | 37.7  | 42.1      | 12.7           |
| 1 600                           | 5 026              | 2.01                  | 2 010                               | 5.03                     | 40.2  | 44.9      | 13.6           |
| 1 700                           | 5 340              | 2.27                  | 2 270                               | 5.34                     | 42.7  | 47.7      | 14.4           |
| 1 800                           | 5 655              | 2.54                  | 2 540                               | 5.66                     | 45.3  | 50.5      | 15.3           |
| (1 900)                         | 5 969              | 2.84                  | 2 840                               | 5.97                     | 47.8  | 53.3      | 16.1           |
| 2 000                           | 6 283              | 3.14                  | 3 140                               | 6.28                     | 50.2  | 56.1      | 17.0           |
| (2 100)                         | 6 597              | 3.46                  | 3 460                               | 6.60                     | 52.8  | 58.9      | 17.8           |
| 2 200                           | 6 911              | 3.80                  | 3 800                               | 6.91                     | 55.3  | 61.7      | 18.7           |
| 2 300                           | 7 225              | 4.15                  | 4 150                               | 7.23                     | 57.8  | 64.6      | 19.5           |
| 2 400                           | 7 540              | 4.52                  | 4 520                               | 7.54                     | 60.3  | 67.3      | 20.4           |
| 2 600                           | 8 168              | 5.31                  | 5 310                               | 8.17                     | 65.3  | 73.0      | 22.1           |
| 2 800                           | 8 796              | 6.16                  | 6 160                               | 8.80                     | 70.4  | 78.6      | 23.8           |
| 3 000                           | 9 424              | 7.07                  | 7 070                               | 9.42                     | 75.4  | 84.1      | 25.4           |
| 3 200                           | 10 053             | 8.04                  | 8 040                               | 10.1                     | 80.8  | 90.2      | 27.3           |
| (3 400)                         | 10 681             | 9.08                  | 9 080                               | 10.7                     | 85.6  | 95.6      | 28.9           |
| 3 600                           | 11 310             | 10.2                  | 10 200                              | 11.3                     | 90.4  | 101       | 30.5           |
| (3 800)                         | 11 938             | 11.3                  | 11 300                              | 11.9                     | 95.2  | 106       | 32.1           |
| 4 000                           | 12 566             | 12.6                  | 12 600                              | 12.6                     | 101   | 113       | 34.0           |
| (4 250)                         | 13 351             | 14.2                  | 14 200                              | 13.4                     | 107   | 120       | 36.2           |
| 4 500                           | 14 137             | 15.9                  | 15 900                              | 14.1                     | 113   | 126       | 38.1           |
| (4 750)                         | 14 923             | 17.7                  | 17 700                              | 14.9                     | 119   | 133       | 40.2           |
| 5 000                           | 15 708             | 19.6                  | 19 600                              | 15.7                     | 126   | 140       | 42.4           |

$$\text{Circumference} = 3.14 \times D \text{ mm Cross-Section} = \frac{0.7854 \times D^2}{10^6} \text{ m}^2$$

$$\text{Volumetric capacity per metre height} = \frac{0.7854 \times D^2}{10^3} \text{ litres}$$

$$\text{Surface per metre height} = \frac{3.14 \times D}{10^3} \text{ m}^2$$

Weights are based on the following specific gravities:

|                  |      |
|------------------|------|
| Ferrous material | 8.0  |
| Copper           | 8.93 |
| Aluminium        | 2.7  |

## APPENDIX B

( Clause 0.5 )

### HEMISPHERICAL HEADS

| NOMINAL<br>DIAMETER<br><i>D</i> | DEPTH<br><i>h</i> | VOLUMETRIC<br>CAPACITY | SURFACE               | WEIGHT PER MILLIMETRE<br>MATERIAL THICKNESS |           |           |
|---------------------------------|-------------------|------------------------|-----------------------|---|-----------|-----------|
|                                 |                   |                        |                       | Ferrous<br>Material                         | Copper    | Aluminium |
| (1)<br>mm                       | (2)<br>mm         | (3)<br>litres          | (4)<br>m <sup>2</sup> | (5)<br>kg                                   | (6)<br>kg | (7)<br>kg |
| 100                             | 50                | 0.26                   | 0.01                  | 0.080                                       | 0.089     | 0.027     |
| 125                             | 63                | 0.51                   | 0.02                  | 0.160                                       | 0.179     | 0.054     |
| 150                             | 75                | 0.88                   | 0.03                  | 0.240                                       | 0.268     | 0.081     |
| 200                             | 100               | 2.10                   | 0.06                  | 0.480                                       | 0.536     | 0.162     |
| 250                             | 125               | 4.09                   | 0.10                  | 0.800                                       | 0.893     | 0.270     |
| 300                             | 150               | 7.07                   | 0.14                  | 1.12  | 1.25      | 0.378     |
| (350)                           | 175               | 11.2                   | 0.19                  | 1.52  | 1.70      | 0.513     |
| 400                             | 200               | 16.8                   | 0.25                  | 2.00  | 2.23      | 0.675     |
| 500                             | 250               | 32.7                   | 0.39                  | 3.12  | 3.48      | 1.05      |
| 600                             | 300               | 56.5                   | 0.57                  | 4.56  | 5.09      | 1.54      |
| 700                             | 350               | 89.8                   | 0.77                  | 6.16  | 6.88      | 2.08      |
| 800                             | 400               | 134                    | 1.00                  | 8.00  | 8.93      | 2.70      |
| 900                             | 450               | 191                    | 1.27                  | 10.2  | 11.3      | 3.43      |
| 1 000                           | 500               | 262                    | 1.57                  | 12.6  | 14.0      | 4.24      |
| 1 100                           | 550               | 348                    | 1.90                  | 15.2  | 17.0      | 5.13      |
| 1 200                           | 600               | 452                    | 2.26                  | 18.1  | 20.2      | 6.10      |
| (1 300)                         | 650               | 575                    | 2.66                  | 21.3  | 23.8      | 7.18      |
| 1 400                           | 700               | 718                    | 3.08                  | 24.6  | 27.5      | 8.32      |
| (1 500)                         | 750               | 883                    | 3.54                  | 28.3  | 31.6      | 9.56      |
| 1 600                           | 800               | 1 072                  | 4.02                  | 32.2  | 35.9      | 10.9      |
| (1 700)                         | 850               | 1 286                  | 4.54                  | 36.3  | 40.5      | 12.3      |
| 1 890                           | 900               | 1 526                  | 5.10                  | 40.8  | 45.5      | 13.8      |
| (1 900)                         | 950               | 1 795                  | 5.68                  | 45.4  | 50.7      | 15.3      |
| 2 000                           | 1 000             | 2 096                  | 6.29                  | 50.3  | 56.2      | 17.0      |
| 2 100                           | 1 050             | 2 426                  | 6.93                  | 55.4  | 61.9      | 18.7      |

( Continued )

APPENDIX B — *Contd*

| NOMINAL<br>DIAMETER<br><i>D</i> | DEPTH<br><i>h</i> | VOLUMETRIC<br>CAPACITY | SURFACE               | WEIGHT PER MILLIMETRE<br>MATERIAL THICKNESS |           |           |
|---------------------------------|-------------------|------------------------|-----------------------|---|-----------|-----------|
|                                 |                   |                        |                       | Ferrous<br>Material                         | Copper    | Aluminium |
| (1)<br>mm                       | (2)<br>mm         | (3)<br>litres          | (4)<br>m <sup>2</sup> | (5)<br>kg                                   | (6)<br>kg | (7)<br>kg |
| (2 200)                         | 1 100             | 2 788                  | 7.61                  | 60.9  | 68.0      | 20.5      |
| 2 300                           | 1 150             | 3 184                  | 8.32                  | 66.6  | 74.3      | 22.5      |
| 2 400                           | 1 200             | 3 616                  | 9.02                  | 72.4  | 80.8      | 24.4      |
| 2 600                           | 1 300             | 4 600                  | 10.6                  | 84.8  | 94.7      | 28.6      |
| 2 800                           | 1 400             | 5 746                  | 12.3                  | 98.4  | 110       | 33.2      |
| 3 000                           | 1 500             | 7 068                  | 14.1                  | 113   | 126       | 38.1      |
| 3 200                           | 1 600             | 8 576                  | 16.1                  | 129   | 144       | 43.5      |
| (3 400)                         | 1 700             | 10 284                 | 18.2                  | 146   | 163       | 49.1      |
| 3 600                           | 1 800             | 12 210                 | 20.4                  | 163   | 182       | 55.1      |
| 3 800                           | 1 900             | 14 362                 | 22.7                  | 182   | 203       | 61.3      |
| 4 000                           | 2 000             | 16 750                 | 25.1                  | 201   | 224       | 67.8      |
| (4 250)                         | 2 125             | 20 090                 | 28.4                  | 227   | 254       | 76.7      |
| 4 500                           | 2 250             | 23 740                 | 31.8                  | 254   | 284       | 85.9      |
| (4 750)                         | 2 375             | 28 040                 | 35.5                  | 284   | 317       | 95.8      |
| 5 000                           | 2 500             | 32 720                 | 39.3                  | 314   | 351       | 106       |

Depth,  $h = 0.5 \times D$  mmSurface =  $\frac{1.57 \times D^2}{10^6}$  m<sup>2</sup>Volumetric capacity =  $\frac{0.2618 \times D^3}{10^6}$  litres

## APPENDIX C

( Clause 0.5 )

## TORISPHERICAL HEADS ( KNUCKLE RADIUS = 0.06D )

| SL<br>No. | NOMINAL<br>DIAMETER<br><i>D</i> | DEPTH<br><i>h</i> | VOLUMETRIC<br>CAPACITY | SURFACE               | WEIGHT PER MILLIMETRE<br>MATERIAL THICKNESS |           |           |
|-----------|---------------------------------|-------------------|------------------------|-----------------------|---|-----------|-----------|
|           |                                 |                   |                        |                       | Ferrous<br>Material                         | Copper    | Aluminium |
| (1)       | (2)<br>mm                       | (3)<br>mm         | (4)<br>litres          | (5)<br>m <sup>2</sup> | (6)<br>kg                                   | (7)<br>kg | (8)<br>kg |
| 1         | 100                             | 17                | 0.086                  | 0.011                 | 0.088                                       | 0.098     | 0.030     |
| 2         | 125                             | 21                | 0.168                  | 0.017                 | 0.136                                       | 0.152     | 0.146     |
| 3         | 150                             | 26                | 0.290                  | 0.024                 | 0.192                                       | 0.214     | 0.065     |
| 4         | 200                             | 34                | 0.687                  | 0.04                  | 0.320                                       | 0.357     | 0.108     |
| 5         | 250                             | 43                | 0.34                   | 0.07                  | 0.560                                       | 0.625     | 0.189     |

( Continued )

APPENDIX C — *Contd*

| SL<br>No. | NOMINAL<br>DIAMETER<br><i>D</i> | DEPTH<br><i>h</i> | VOLUMETRIC<br>CAPACITY | SURFACE        | WEIGHT PER MILLIMETRE<br>MATERIAL THICKNESS |        |           |
|-----------|---------------------------------|-------------------|------------------------|----------------|---|--------|-----------|
|           |                                 |                   |                        |                | Ferrous<br>Material                         | Copper | Aluminium |
| (1)       | (2)                             | (3)               | (4)                    | (5)            | (6)   | (7)    | (8)       |
|           | mm                              | mm                | litres                 | m <sup>2</sup> | kg  | kg     | kg        |
| 6         | 300                             | 51                | 2.32                   | 0.10           | 0.800                                       | 0.893  | 0.270     |
| 7         | 350                             | 60                | 3.68                   | 0.13           | 1.04  | 1.16   | 0.351     |
| 8         | 400                             | 68                | 5.50                   | 0.17           | 1.36  | 1.52   | 0.459     |
| 9         | 500                             | 85                | 10.7                   | 0.27           | 2.16  | 2.41   | 0.729     |
| 10        | 600                             | 102               | 18.6                   | 0.38           | 3.04  | 3.39   | 1.03      |
| 11        | 700                             | 119               | 29.4                   | 0.52           | 4.16  | 4.64   | 1.40      |
| 12        | 800                             | 126               | 44.0                   | 0.68           | 5.44  | 6.07   | 1.84      |
| 13        | 900                             | 153               | 62.6                   | 0.87           | 6.96  | 7.77   | 2.35      |
| 14        | 1 000                           | 170               | 85.9                   | 1.07           | 8.56  | 9.56   | 2.89      |
| 15        | 1 100                           | 187               | 114                    | 1.29           | 10.3  | 11.5   | 3.48      |
| 16        | 1 200                           | 204               | 148                    | 1.54           | 12.3  | 13.8   | 4.16      |
| 17        | 1 300                           | 221               | 189                    | 1.80           | 14.4  | 16.1   | 4.86      |
| 18        | 1 400                           | 238               | 236                    | 2.09           | 16.7  | 18.7   | 5.64      |
| 19        | 1 500                           | 255               | 290                    | 2.40           | 19.2  | 21.4   | 6.48      |
| 20        | 1 600                           | 272               | 352                    | 2.73           | 21.8  | 24.4   | 7.37      |
| 21        | 1 700                           | 289               | 422                    | 3.09           | 24.7  | 27.4   | 8.34      |
| 22        | 1 800                           | 306               | 501                    | 3.46           | 27.7  | 30.9   | 9.34      |
| 23        | 1 900                           | 323               | 589                    | 3.86           | 30.9  | 34.5   | 10.4      |
| 24        | 2 000                           | 340               | 687                    | 4.27           | 34.2  | 38.1   | 11.5      |
| 25        | 2 100                           | 357               | 795                    | 4.71           | 37.7  | 42.1   | 12.7      |
| 26        | 2 200                           | 374               | 914                    | 5.17           | 41.4  | 46.2   | 14.0      |
| 27        | 2 300                           | 391               | 1 045                  | 5.65           | 45.2  | 50.5   | 15.3      |
| 28        | 2 400                           | 408               | 1 188                  | 6.15           | 49.2  | 54.9   | 16.6      |
| 29        | 2 600                           | 442               | 1 510                  | 7.22           | 57.8  | 64.5   | 19.5      |
| 30        | 2 800                           | 476               | 1 885                  | 8.37           | 67.0  | 74.7   | 22.6      |
| 31        | 3 000                           | 510               | 2 319                  | 9.61           | 76.9  | 85.8   | 25.9      |
| 32        | 3 200                           | 544               | 2 814                  | 10.9           | 87.2  | 97.3   | 29.4      |
| 33        | 3 400                           | 578               | 3 375                  | 12.3           | 98.4  | 110    | 33.2      |
| 34        | 3 600                           | 612               | 4 007                  | 13.8           | 110   | 123    | 37.3      |
| 35        | 3 800                           | 646               | 4 713                  | 15.4           | 123   | 138    | 41.6      |
| 36        | 4 000                           | 680               | 5 496                  | 17.1           | 137   | 153    | 46.2      |
| 37        | 4 250                           | 723               | 6 594                  | 19.3           | 154   | 172    | 52.1      |
| 38        | 4 500                           | 765               | 7 825                  | 21.6           | 173   | 193    | 58.3      |
| 39        | 4 750                           | 808               | 9 204                  | 24.1           | 193   | 215    | 65.1      |
| 40        | 5 000                           | 850               | 10 740                 | 26.7           | 214   | 238    | 72.1      |

Volumetric capacity =  $1.05 h^2 (3D - h) \times 10^{-6}$  litres

Surface =  $6.28D \times h \times 10^{-6}$  m<sup>2</sup>

Depth,  $h = 0.17 \times D$  mm.

## APPENDIX D

( Clause 0.5 )

TORISPHERICAL HEADS ( KNUCKLE RADIUS =  $0.10D$  )

| Sl<br>No. | NOMINAL<br>DIAMETER<br>$D$ | DEPTH<br>$h$ | VOLUME-<br>METRIC<br>CAPACITY | SURFACE | WEIGHT PER MILLIMETRE<br>MATERIAL THICKNESS |        |           |
|-----------|----------------------------|--------------|-------------------------------|---------|---|--------|-----------|
|           |                            |              |                               |         | Ferrous<br>Material                         | Copper | Aluminium |
| (1)       | (2)                        | (3)          | (4)                           | (5)     | (6)   | (7)    | (8)       |
|           | mm                         | mm           | litres                        | $m^2$   | kg  | kg     | kg        |
| 1         | 100                        | 19           | 0.111                         | 0.012   | 0.096                                       | 0.107  | 0.032     |
| 2         | 125                        | 24           | 0.217                         | 0.019   | 0.152                                       | 0.170  | 0.051     |
| 3         | 150                        | 29           | 0.374                         | 0.027   | 0.216                                       | 0.241  | 0.073     |
| 4         | 200                        | 39           | 0.887                         | 0.05    | 0.400                                       | 0.447  | 0.135     |
| 5         | 250                        | 49           | 1.73                          | 0.08    | 0.640                                       | 0.714  | 0.216     |
| 6         | 300                        | 50           | 2.99                          | 0.11    | 0.880                                       | 0.982  | 0.297     |
| 7         | 350                        | 68           | 4.76                          | 0.15    | 1.20  | 1.34   | 0.405     |
| 8         | 400                        | 78           | 7.10                          | 0.19    | 1.52  | 1.70   | 0.513     |
| 9         | 500                        | 97           | 13.9                          | 0.30    | 2.40  | 2.68   | 0.810     |
| 10        | 600                        | 116          | 24.0                          | 0.44    | 3.52  | 3.93   | 1.19      |
| 11        | 700                        | 136          | 38.0                          | 0.60    | 4.80  | 5.36   | 1.62      |
| 12        | 800                        | 155          | 56.8                          | 0.78    | 6.24  | 6.97   | 2.11      |
| 13        | 900                        | 175          | 80.8                          | 0.99    | 7.92  | 8.84   | 2.67      |
| 14        | 1 000                      | 194          | 111                           | 1.22    | 9.76  | 10.9   | 3.29      |
| 15        | 1 100                      | 213          | 148                           | 1.47    | 11.8  | 13.1   | 3.97      |
| 16        | 1 200                      | 233          | 192                           | 1.75    | 14.0  | 15.6   | 4.72      |
| 17        | 1 300                      | 252          | 244                           | 2.06    | 16.5  | 18.4   | 5.56      |
| 18        | 1 400                      | 272          | 304                           | 2.39    | 19.1  | 21.3   | 6.45      |
| 19        | 1 500                      | 291          | 374                           | 2.74    | 21.9  | 24.5   | 7.40      |
| 20        | 1 600                      | 310          | 455                           | 3.12    | 25.0  | 27.9   | 8.42      |
| 21        | 1 700                      | 330          | 545                           | 3.52    | 28.2  | 31.4   | 9.50      |
| 22        | 1 800                      | 349          | 647                           | 3.95    | 31.6  | 35.3   | 10.7      |
| 23        | 1 900                      | 369          | 761                           | 4.40    | 35.2  | 39.3   | 11.9      |
| 24        | 2 000                      | 388          | 887                           | 4.87    | 39.0  | 43.5   | 13.2      |
| 25        | 2 100                      | 407          | 1 027                         | 5.37    | 43.0  | 48.0   | 14.15     |
| 26        | 2 200                      | 427          | 1 181                         | 5.90    | 47.2  | 52.7   | 15.9      |
| 27        | 2 300                      | 446          | 1 349                         | 6.45    | 51.6  | 57.6   | 17.4      |
| 28        | 2 400                      | 466          | 1 533                         | 7.02    | 56.2  | 62.7   | 19.0      |
| 29        | 2 600                      | 504          | 1 949                         | 8.24    | 65.9  | 73.6   | 22.2      |
| 30        | 2 800                      | 543          | 2 434                         | 9.55    | 76.4  | 85.3   | 25.8      |
| 31        | 3 000                      | 582          | 2 994                         | 11.0    | 88.0  | 98.2   | 29.7      |
| 32        | 3 200                      | 621          | 3 634                         | 12.5    | 100   | 112    | 33.8      |
| 33        | 3 400                      | 660          | 4 358                         | 14.1    | 113   | 126    | 38.1      |
| 34        | 3 600                      | 698          | 5 175                         | 15.8    | 126   | 141    | 42.7      |
| 35        | 3 800                      | 737          | 6 085                         | 17.6    | 141   | 157    | 47.5      |

( Continued )

APPENDIX D — *Contd*

| Sl No. | NOMINAL DIAMETER<br><i>D</i> | DEPTH<br><i>h</i> | VOLUME-METRIC CAPACITY | SURFACE        | WEIGHT PER MILLIMETRE MATERIAL THICKNESS |        |           |
|--------|------------------------------|-------------------|------------------------|----------------|--|--------|-----------|
|        |                              |                   |                        |                | Ferrous Material                         | Copper | Aluminium |
| (1)    | (2)                          | (3)               | (4)                    | (5)            | (6)                                      | (7)    | (8)       |
|        | mm                           | mm                | litres                 | m <sup>2</sup> | kg                                       | kg     | kg        |
| 36     | 4 000                        | 776               | 7 098                  | 19.5           | 156                                      | 174    | 52.6      |
| 37     | 4 250                        | 825               | 8 513                  | 22.0           | 176                                      | 196    | 59.4      |
| 38     | 4 500                        | 873               | 10 100                 | 24.7           | 198                                      | 221    | 66.7      |
| 39     | 4 750                        | 922               | 11 890                 | 27.5           | 220                                      | 246    | 74.2      |
| 40     | 5 000                        | 970               | 13 870                 | 30.5           | 244                                      | 272    | 82.4      |

Volumetric capacity =  $1.05 h^2 (3D - h) \times 10^{-6}$  litres

Surface =  $6.28D \times h \times 10^{-6}$  m<sup>2</sup>

Depth,  $h = 0.194 \times D$  mm

## APPENDIX E

( Clause 0.5 )

## SEMI-ELLIPSOIDAL OR EQUIVALENT TORISPHERICAL HEADS

| Sl No. | NOMINAL DIAMETER<br><i>D</i> | DEPTH<br><i>h</i> | VOLUME-METRIC CAPACITY | SURFACE        | WEIGHT PER MILLIMETRE MATERIAL THICKNESS |        |           |
|--------|------------------------------|-------------------|------------------------|----------------|--|--------|-----------|
|        |                              |                   |                        |                | Ferrous Material                         | Copper | Aluminium |
| (1)    | (2)                          | (3)               | (4)                    | (5)            | (6)                                      | (7)    | (8)       |
|        | mm                           | mm                | litres                 | m <sup>2</sup> | kg                                       | kg     | kg        |
| 1      | 100                          | 25                | 0.13                   | 0.011          | 0.088                                    | 0.098  | 0.030     |
| 2      | 125                          | 31                | 0.25                   | 0.017          | 0.136                                    | 0.152  | 0.045     |
| 3      | 150                          | 38                | 0.44                   | 0.025          | 0.200                                    | 0.224  | 0.068     |
| 4      | 200                          | 50                | 1.05                   | 0.04           | 0.320                                    | 0.357  | 0.108     |
| 5      | 250                          | 63                | 2.05                   | 0.07           | 0.560                                    | 0.625  | 0.189     |
| 6      | 300                          | 75                | 3.53                   | 0.10           | 0.800                                    | 0.893  | 0.270     |
| 7      | (350)                        | 88                | 5.61                   | 0.13           | 1.04                                     | 1.16   | 0.351     |
| 8      | 400                          | 100               | 8.38                   | 0.17           | 1.36                                     | 1.52   | 0.459     |
| 9      | 500                          | 125               | 16.4                   | 0.27           | 2.16                                     | 2.41   | 0.729     |
| 10     | 600                          | 150               | 28.3                   | 0.39           | 3.12                                     | 3.48   | 1.05      |

( Continued )

APPENDIX E — *Contd*

| Sl. No. | NOMINAL DIAMETER<br><i>D</i> | DEPTH<br><i>h</i> | VOLUME-<br>METRIC<br>CAPACITY | SURFACE        | WEIGHT PER MILLIMETRE<br>MATERIAL THICKNESS |        |                |
|---------|------------------------------|-------------------|-------------------------------|----------------|---|--------|----------------|
|         |                              |                   |                               |                | Ferrous<br>Material                         | Copper | Alumi-<br>nium |
| (1)     | (2)                          | (3)               | (4)                           | (5)            | (6)   | (7)    | (8)            |
|         | mm                           | mm                | litres                        | m <sup>2</sup> | kg  | kg     | kg             |
| 11      | 700                          | 175               | 44.9                          | 0.53           | 4.24  | 4.73   | 1.43           |
| 12      | 800                          | 200               | 67                            | 0.70           | 5.60  | 6.25   | 1.89           |
| 13      | 900                          | 225               | 95.4                          | 0.88           | 7.04  | 7.86   | 2.38           |
| 14      | 1 000                        | 250               | 131                           | 1.09           | 8.72  | 9.73   | 2.94           |
| 15      | 1 100                        | 275               | 174                           | 1.32           | 10.6  | 11.8   | 3.56           |
| 16      | 1 200                        | 300               | 226                           | 1.57           | 12.6  | 14.0   | 4.24           |
| 17      | (1 300)                      | 325               | 288                           | 1.84           | 14.7  | 16.4   | 4.97           |
| 18      | 1 400                        | 350               | 359                           | 2.14           | 17.1  | 19.1   | 5.78           |
| 19      | (1 500)                      | 375               | 442                           | 2.45           | 19.6  | 21.9   | 6.62           |
| 20      | 1 600                        | 400               | 536                           | 2.79           | 22.3  | 24.9   | 7.53           |
| 21      | (1 700)                      | 425               | 643                           | 3.15           | 25.2  | 28.1   | 8.50           |
| 22      | 1 800                        | 450               | 763                           | 3.53           | 28.2  | 31.5   | 9.53           |
| 23      | 1 900                        | 475               | 898                           | 3.93           | 31.4  | 35.1   | 10.6           |
| 24      | (2 000)                      | 500               | 1 048                         | 4.36           | 34.9  | 38.9   | 11.8           |
| 25      | 2 100                        | 525               | 1 213                         | 4.81           | 38.5  | 43.0   | 13.0           |
| 26      | 2 200                        | 550               | 1 394                         | 5.28           | 42.2  | 47.2   | 14.3           |
| 27      | 2 300                        | 575               | 1 592                         | 5.77           | 46.2  | 51.5   | 15.6           |
| 28      | 2 400                        | 600               | 1 808                         | 6.28           | 50.2  | 56.1   | 17.0           |
| 29      | 2 600                        | 650               | 2 300                         | 7.37           | 59.0  | 65.8   | 19.9           |
| 30      | 2 800                        | 700               | 2 873                         | 8.55           | 68.4  | 76.4   | 23.1           |
| 31      | 3 000                        | 750               | 3 534                         | 9.81           | 78.5  | 87.6   | 26.5           |
| 32      | 3 200                        | 800               | 4 288                         | 11.2           | 89.6  | 100    | 30.2           |
| 33      | 3 400                        | 850               | 5 142                         | 12.6           | 101   | 113    | 34.0           |
| 34      | 3 600                        | 900               | 6 105                         | 14.1           | 113   | 126    | 38.1           |
| 35      | (3 800)                      | 950               | 7 181                         | 15.7           | 126   | 140    | 42.4           |
| 36      | 4 000                        | 1 000             | 8 375                         | 17.4           | 139   | 155    | 47.0           |
| 37      | (4 250)                      | 1 063             | 10 045                        | 19.7           | 158   | 176    | 53.2           |
| 38      | 4 500                        | 1 125             | 11 870                        | 22.1           | 177   | 197    | 59.7           |
| 39      | (4 750)                      | 1 188             | 14 020                        | 24.6           | 197   | 220    | 66.4           |
| 40      | 5 000                        | 1 250             | 16 360                        | 27.2           | 218   | 243    | 73.4           |

Depth,  $h = 0.25 \times D$  mm

Volumetric capacity =  $\frac{0.1309 \times D^3}{10^6}$  litres

Surface =  $1.09 D^2 \times 10^{-6}$  m<sup>2</sup>

## APPENDIX F

( Clause 0.5 )

## 45° CONICAL HEADS

| NOMINAL<br>DIAMETER<br><i>D</i> | DEPTH<br><i>h</i> | LATERAL<br>LENGTH | VOLUME-<br>METRIC<br>CAPACITY | SURFACE        | WEIGHT PER MILLIMETRE<br>MATERIAL THICKNESS |        |                |
|---------------------------------|-------------------|-------------------|-------------------------------|----------------|---|--------|----------------|
|                                 |                   |                   |                               |                | Ferrous<br>Material                         | Copper | Alumi-<br>nium |
| (1)                             | (2)               | (3)               | (4)                           | (5)            | (6)   | (7)    | (8)            |
| mm                              | mm                | mm                | litres                        | m <sup>2</sup> | kg  | kg     | kg             |
| 100                             | 50                | 70                | 0.13                          | 0.011          | 0.088                                       | 0.098  | 0.030          |
| 125                             | 63                | 87                | 0.25                          | 0.017          | 0.136                                       | 0.152  | 0.046          |
| 150                             | 75                | 105               | 0.44                          | 0.025          | 0.200                                       | 0.223  | 0.068          |
| 200                             | 100               | 140               | 1.05                          | 0.044          | 0.352                                       | 0.393  | 0.119          |
| 250                             | 125               | 175               | 2.05                          | 0.069          | 0.552                                       | 0.616  | 0.186          |
| 300                             | 150               | 210               | 3.53                          | 0.099          | 0.792                                       | 0.884  | 0.267          |
| (350)                           | 175               | 245               | 5.61                          | 0.135          | 1.08  | 1.21   | 0.365          |
| 400                             | 200               | 280               | 8.38                          | 0.176          | 1.41  | 1.57   | 0.475          |
| 500                             | 250               | 350               | 16.4                          | 0.275          | 2.20  | 2.46   | 0.743          |
| 600                             | 300               | 420               | 28.3                          | 0.396          | 3.17  | 3.54   | 1.07           |
| 700                             | 350               | 490               | 44.9                          | 0.538          | 4.30  | 4.80   | 1.45           |
| 800                             | 400               | 560               | 67.0                          | 0.703          | 5.62  | 6.28   | 1.90           |
| 900                             | 450               | 630               | 95.4                          | 0.890          | 7.12  | 7.95   | 2.40           |
| 1 000                           | 500               | 700               | 131                           | 1.10           | 8.80  | 9.82   | 2.97           |
| 1 100                           | 550               | 770               | 174                           | 1.33           | 10.6  | 11.9   | 3.59           |
| 1 200                           | 600               | 840               | 226                           | 1.58           | 12.6  | 14.1   | 4.27           |
| (1 300)                         | 650               | 910               | 288                           | 1.86           | 14.9  | 16.6   | 5.02           |
| 1 400                           | 700               | 980               | 359                           | 2.15           | 17.2  | 19.2   | 5.81           |
| (1 500)                         | 750               | 1 050             | 442                           | 2.47           | 19.8  | 22.1   | 6.67           |
| 1 600                           | 800               | 1 120             | 536                           | 2.81           | 22.5  | 25.1   | 7.59           |
| 1 700                           | 850               | 1 190             | 643                           | 3.18           | 25.4  | 28.4   | 8.59           |
| 1 800                           | 900               | 1 260             | 763                           | 3.56           | 28.5  | 31.8   | 9.61           |
| 1 900                           | 950               | 1 330             | 898                           | 3.97           | 31.8  | 35.5   | 10.7           |
| 2 000                           | 1 000             | 1 400             | 1 048                         | 4.39           | 35.1  | 39.2   | 11.9           |
| 2 100                           | 1 050             | 1 470             | 1 213                         | 4.85           | 38.8  | 43.3   | 13.1           |
| 2 200                           | 1 100             | 1 540             | 1 394                         | 5.32           | 42.6  | 47.5   | 14.4           |
| 2 300                           | 1 150             | 1 610             | 1 593                         | 5.81           | 46.5  | 51.9   | 15.7           |
| 2 400                           | 1 200             | 1 680             | 1 808                         | 6.33           | 50.6  | 56.5   | 17.1           |
| 2 600                           | 1 300             | 1 820             | 2 300                         | 7.43           | 59.4  | 66.3   | 20.0           |
| 2 800                           | 1 400             | 1 960             | 2 873                         | 8.62           | 69.0  | 77.0   | 23.3           |
| 3 000                           | 1 500             | 2 100             | 3 534                         | 9.89           | 79.1  | 88.3   | 26.7           |
| 3 200                           | 1 600             | 2 240             | 4 288                         | 11.3           | 90.4  | 101    | 30.5           |
| 3 400                           | 1 700             | 2 380             | 5 145                         | 12.7           | 102   | 113    | 34.3           |
| 3 600                           | 1 800             | 2 520             | 6 105                         | 14.3           | 114   | 128    | 38.6           |
| (3 800)                         | 1 900             | 2 660             | 7 183                         | 15.9           | 127   | 142    | 42.9           |

( Continued )



APPENDIX F — *Contd*

| NOMINAL<br>DIAMETER<br><i>D</i> | DEPTH<br><i>h</i> | LATERAL<br>LENGTH | VOLUME-<br>METRIC<br>CAPACITY | SURFACE        | WEIGHT PER MILLIMETRE<br>MATERIAL THICKNESS |        |                |
|---------------------------------|-------------------|-------------------|-------------------------------|----------------|---|--------|----------------|
|                                 |                   |                   |                               |                | Ferrous<br>Material                         | Copper | Alumi-<br>nium |
| (1)                             | (2)               | (3)               | (4)                           | (5)            | (6)   | (7)    | (8)            |
| mm                              | mm                | mm                | litres                        | m <sup>2</sup> | kg  | kg     | kg             |
| 4 000                           | 2 000             | 2 800             | 8 375                         | 17.6           | 141   | 157    | 47.5           |
| (4 250)                         | 2 125             | 2 975             | 10 050                        | 19.9           | 159   | 178    | 53.7           |
| 4 500                           | 2 250             | 3 150             | 11 930                        | 22.2           | 178   | 198    | 59.9           |
| (4 750)                         | 2 375             | 3 325             | 14 030                        | 24.8           | 198   | 221    | 67.0           |
| 5 000                           | 2 500             | 3 500             | 16 360                        | 27.5           | 220   | 246    | 74.3           |

Depth,  $h = 0.5 \times D$  mmLateral length =  $0.7 \times D$  mmVolume =  $\frac{0.1309 \times D^3}{10^6}$  litresSurface =  $\frac{1.099 \times D^2}{10^6}$  m<sup>2</sup>

## APPENDIX G

( Clause 0.5 )

## 30° CONICAL HEADS

| NOMINAL<br>DIAMETER<br><i>D</i> | DEPTH<br><i>h</i> | LATERAL<br>LENGTH | VOLUMETRIC<br>CAPACITY | SURFACE        | WEIGHT PER MILLIMETRE<br>MATERIAL THICKNESS |        |                |
|---------------------------------|-------------------|-------------------|------------------------|----------------|---|--------|----------------|
|                                 |                   |                   |                        |                | Ferrous<br>Material                         | Copper | Alumi-<br>nium |
| (1)                             | (2)               | (3)               | (4)                    | (5)            | (6)   | (7)    | (8)            |
| mm                              | mm                | mm                | litres                 | m <sup>2</sup> | kg  | kg     | kg             |
| 100                             | 29                | 58                | 0.08                   | 0.009          | 0.072                                       | 0.080  | 0.024          |
| 125                             | 36                | 72                | 0.15                   | 0.014          | 0.112                                       | 0.125  | 0.038          |
| 150                             | 43                | 86                | 0.26                   | 0.020          | 0.160                                       | 0.179  | 0.054          |
| 200                             | 58                | 116               | 0.61                   | 0.036          | 0.288                                       | 0.321  | 0.097          |
| 250                             | 72                | 144               | 1.19                   | 0.056          | 0.448                                       | 0.500  | 0.151          |
| 300                             | 86                | 172               | 2.05                   | 0.081          | 0.648                                       | 0.723  | 0.219          |
| (350)                           | 101               | 202               | 3.26                   | 0.111          | 0.888                                       | 0.991  | 0.300          |
| 400                             | 115               | 230               | 4.86                   | 0.145          | 1.16  | 1.30   | 0.392          |
| 500                             | 144               | 288               | 9.50                   | 0.227          | 1.82  | 2.03   | 0.613          |
| 600                             | 173               | 346               | 16.4                   | 0.326          | 2.61  | 2.91   | 0.880          |

( Continued )

## APPENDIX G — Contd

| NOMINAL<br>DIAMETER<br><i>D</i> | DEPTH<br><i>h</i> | LATERAL<br>LENGTH | VOLUMETRIC<br>CAPACITY | SURFACE        | WEIGHT PER MILLIMETRE<br>MATERIAL THICKNESS |        |               |
|---------------------------------|-------------------|-------------------|------------------------|----------------|---|--------|---------------|
|                                 |                   |                   |                        |                | Ferrous<br>Material                         | Copper | Alumi-<br>num |
| (1)                             | (2)               | (3)               | (4)                    | (5)            | (6)   | (7)    | (8)           |
| mm                              | mm                | mm                | litres                 | m <sup>2</sup> | kg  | kg     | kg            |
| 700                             | 202               | 404               | 26.1                   | 0.444          | 3.55  | 3.96   | 1.20          |
| 800                             | 231               | 462               | 38.9                   | 0.580          | 4.64  | 5.18   | 1.57          |
| 900                             | 260               | 519               | 55.4                   | 0.733          | 5.86  | 6.55   | 1.98          |
| 1 000                           | 289               | 577               | 76.0                   | 0.906          | 7.25  | 8.09   | 2.45          |
| 1 100                           | 318               | 635               | 101                    | 1.09           | 8.72  | 9.73   | 2.94          |
| (1 200)                         | 346               | 692               | 131                    | 1.30           | 10.4  | 11.6   | 3.51          |
| (1 300)                         | 375               | 750               | 167                    | 1.53           | 12.2  | 13.7   | 4.13          |
| 1 400                           | 404               | 808               | 208                    | 1.77           | 14.2  | 15.8   | 4.78          |
| (1 500)                         | 433               | 866               | 256                    | 2.04           | 16.3  | 18.2   | 5.51          |
| 1 600                           | 462               | 923               | 311                    | 2.32           | 18.6  | 20.7   | 6.26          |
| 1 700                           | 491               | 981               | 373                    | 2.62           | 21.0  | 23.4   | 7.07          |
| 1 800                           | 520               | 1 039             | 443                    | 2.94           | 23.5  | 26.2   | 7.94          |
| 1 900                           | 549               | 1 096             | 521                    | 3.27           | 26.2  | 29.2   | 8.83          |
| 2 000                           | 578               | 1 154             | 608                    | 3.62           | 29.0  | 32.3   | 9.77          |
| 2 100                           | 607               | 1 212             | 704                    | 3.99           | 31.9  | 35.6   | 10.8          |
| 2 200                           | 635               | 1 269             | 809                    | 4.38           | 35.0  | 39.1   | 11.8          |
| 2 300                           | 664               | 1 327             | 924                    | 4.79           | 38.3  | 42.8   | 12.9          |
| 2 400                           | 693               | 1 385             | 1 051                  | 5.22           | 41.8  | 46.6   | 14.1          |
| 2 600                           | 751               | 1 500             | 1 336                  | 6.12           | 49.0  | 54.7   | 16.5          |
| 2 800                           | 809               | 1 618             | 1 669                  | 7.10           | 56.8  | 63.4   | 19.1          |
| 3 000                           | 867               | 1 731             | 2 052                  | 8.15           | 65.2  | 72.8   | 22.0          |
| 3 200                           | 924               | 1 846             | 2 490                  | 9.27           | 74.2  | 82.8   | 25.0          |
| 3 400                           | 982               | 1 962             | 2 987                  | 10.5           | 84.0  | 93.8   | 28.4          |
| 3 600                           | 1 040             | 2 077             | 3 546                  | 11.7           | 93.6  | 105    | 31.6          |
| (3 800)                         | 1 098             | 2 193             | 4 171                  | 13.1           | 105   | 117    | 35.4          |
| 4 000                           | 1 156             | 2 308             | 4 865                  | 14.5           | 116   | 130    | 39.2          |
| (4 250)                         | 1 228             | 2 452             | 5 834                  | 16.4           | 131   | 146    | 44.3          |
| 4 500                           | 1 300             | 2 596             | 6 925                  | 18.3           | 146   | 163    | 49.4          |
| (4 750)                         | 1 372             | 2 741             | 8 145                  | 20.4           | 163   | 182    | 55.1          |
| 5 000                           | 1 445             | 2 885             | 9 500                  | 22.6           | 181   | 202    | 61.0          |

Depth,  $h = 0.289 \times D$  mmLateral length =  $0.577 \times D$  mmVolumetric capacity =  $\frac{0.076 \times D^3}{10^6}$  litresSurface =  $\frac{0.906 \times D^2}{10^6}$  m<sup>2</sup>

## APPENDIX H

( Clause 0.5 )

## 10° CONICAL HEADS

| Sl. No. | NOMINAL DIAMETER<br><i>D</i> | DEPTH<br><i>h</i> | LATERAL LENGTH | VOLUME METRIC CAPACITY | SURFACE        | WEIGHT PER MILLIMETRE MATERIAL THICKNESS |        |           |
|---------|------------------------------|-------------------|----------------|------------------------|----------------|--|--------|-----------|
|         |                              |                   |                |                        |                | Ferrous Material                         | Copper | Aluminium |
| (1)     | (2)                          | (3)               | (4)            | (5)                    | (6)            | (7)                                      | (8)    | (9)       |
|         | mm                           | mm                | mm             | litres                 | m <sup>2</sup> | kg                                       | kg     | kg        |
| 1       | 100                          | 9                 | 51             | 0.023                  | 0.008          | 0.064                                    | 0.071  | 0.022     |
| 2       | 125                          | 11                | 63             | 0.045                  | 0.012          | 0.096                                    | 0.107  | 0.033     |
| 3       | 150                          | 13                | 76             | 0.078                  | 0.018          | 0.144                                    | 0.160  | 0.048     |
| 4       | 200                          | 18                | 101            | 0.184                  | 0.032          | 0.256                                    | 0.285  | 0.086     |
| 5       | 250                          | 22                | 127            | 0.359                  | 0.050          | 0.400                                    | 0.446  | 0.135     |
| 6       | 300                          | 26                | 152            | 0.621                  | 0.072          | 0.576                                    | 0.643  | 0.194     |
| 7       | (350)                        | 31                | 178            | 0.986                  | 0.098          | 0.784                                    | 0.875  | 0.264     |
| 8       | 400                          | 35                | 203            | 1.47                   | 0.128          | 1.02                                     | 1.14   | 0.346     |
| 9       | 500                          | 44                | 254            | 2.88                   | 0.199          | 1.59                                     | 1.78   | 0.538     |
| 10      | 600                          | 53                | 304            | 4.97                   | 0.287          | 2.30                                     | 2.56   | 0.775     |
| 11      | 700                          | 62                | 355            | 7.89                   | 0.391          | 3.13                                     | 3.49   | 1.05      |
| 12      | 800                          | 71                | 406            | 11.8                   | 0.510          | 4.08                                     | 4.55   | 1.38      |
| 13      | 900                          | 79                | 456            | 16.8                   | 0.646          | 5.17                                     | 5.77   | 1.74      |
| 14      | 1 000                        | 88                | 507            | 23.0                   | 0.797          | 6.38                                     | 7.12   | 2.15      |
| 15      | 1 100                        | 97                | 558            | 30.6                   | 0.964          | 7.71                                     | 8.61   | 2.60      |
| 16      | 1 200                        | 106               | 609            | 39.7                   | 1.15           | 9.20                                     | 10.3   | 3.10      |
| 17      | (1 300)                      | 115               | 660            | 50.5                   | 1.35           | 10.8                                     | 12.0   | 3.64      |
| 18      | 1 400                        | 123               | 710            | 63.1                   | 1.56           | 12.5                                     | 14.0   | 4.21      |
| 19      | (1 500)                      | 132               | 761            | 77.6                   | 1.79           | 14.3                                     | 16.0   | 4.83      |
| 20      | 1 600                        | 141               | 812            | 94.2                   | 2.04           | 16.3                                     | 18.2   | 5.51      |
| 21      | 1 700                        | 150               | 863            | 113                    | 2.30           | 18.4                                     | 20.6   | 6.21      |
| 22      | 1 800                        | 159               | 913            | 134                    | 2.58           | 20.7                                     | 23.1   | 6.97      |
| 23      | 1 900                        | 168               | 964            | 158                    | 2.88           | 23.0                                     | 25.7   | 7.77      |
| 24      | 2 000                        | 176               | 1 015          | 184                    | 3.19           | 25.5                                     | 28.5   | 8.61      |
| 25      | 2 100                        | 185               | 1 066          | 213                    | 3.52           | 28.1                                     | 31.4   | 9.50      |
| 26      | 2 200                        | 194               | 1 117          | 245                    | 3.86           | 30.9                                     | 34.4   | 10.4      |
| 27      | 2 300                        | 203               | 1 167          | 280                    | 4.22           | 33.7                                     | 37.7   | 11.4      |
| 28      | 2 400                        | 212               | 1 218          | 318                    | 4.59           | 36.7                                     | 41.0   | 12.4      |
| 29      | 2 600                        | 229               | 1 320          | 404                    | 5.39           | 43.1                                     | 48.1   | 14.6      |
| 30      | 2 800                        | 247               | 1 421          | 505                    | 6.25           | 50.0                                     | 55.8   | 16.9      |

( Continued )

APPENDIX H — *Contd*

| SL<br>No. | NOMINAL<br>DIAMETER<br><i>D</i> | DEPTH<br><i>h</i> | LATERAL<br>LENGTH | VOLUME-<br>METRIC<br>CAPACITY | SURFACE        | WEIGHT PER MILLIMETRE<br>MATERIAL THICKNESS |        |                |
|-----------|---------------------------------|-------------------|-------------------|-------------------------------|----------------|---|--------|----------------|
|           |                                 |                   |                   |                               |                | Ferrous<br>Material                         | Copper | Alumi-<br>nium |
| (1)       | (2)                             | (3)               | (4)               | (5)                           | (6)            | (7)   | (8)    | (9)            |
|           | mm                              | mm                | mm                | litres                        | m <sup>2</sup> | kg  | kg     | kg             |
| 31        | 3 000                           | 265               | 1 523             | 621                           | 7.17           | 57.4  | 64.0   | 19.4           |
| 32        | 3 200                           | 282               | 1 624             | 754                           | 8.16           | 65.3  | 72.9   | 22.0           |
| 33        | 3 400                           | 300               | 1 726             | 904                           | 9.21           | 73.7  | 82.3   | 24.9           |
| 34        | 3 600                           | 318               | 1 827             | 1 073                         | 10.3           | 82.4  | 92.0   | 27.8           |
| 35        | (3 800)                         | 335               | 1 929             | 1 262                         | 11.5           | 92.0  | 103    | 31.1           |
| 36        | 4 000                           | 353               | 2 030             | 1 472                         | 12.8           | 102   | 114    | 34.6           |
| 37        | (4 250)                         | 375               | 2 157             | 1 766                         | 14.4           | 115   | 129    | 38.9           |
| 38        | 4 500                           | 397               | 2 284             | 2 096                         | 16.1           | 129   | 144    | 43.5           |
| 39        | (4 750)                         | 419               | 2 411             | 2 465                         | 18.0           | 144   | 161    | 48.6           |
| 40        | 5 000                           | 441               | 2 538             | 2 875                         | 20.0           | 160   | 178    | 54.0           |

Depth,  $h = 0.0882 \times D$  mm

Lateral length =  $0.5076 \times D$  mm

Volumetric capacity =  $\frac{0.023 \times D^3}{10^6}$  litres

Surface =  $\frac{0.797 \times D^2}{10^6}$  m<sup>2</sup>

# APPENDIX J

( Clause 0.5 )

## 'U' SHAPED SHELLS

| SL. No. | WIDTH OR DIAMETER | HEIGHT ON PARALLEL | HEIGHT ON CURVATURE | CROSS-SECTION         | VOLUME                            | PERIMETER | SURFACE/ METRE LENGTH | WEIGHT PER MILLIMETRE MATERIAL THICKNESS/IN LENGTH |            |            |
|---------|-------------------|--------------------|---------------------|-----------------------|-----------------------------------|-----------|-----------------------|--|------------|------------|
|         |                   |                    |                     |                       |                                   |           |                       | Ferrous Material                                   | Copper     | Aluminium  |
| (1)     | (2)<br>mm         | (3)<br>mm          | (4)<br>mm           | (5)<br>m <sup>2</sup> | (6)<br>litres/<br>metre<br>length | (7)<br>mm | (8)<br>m <sup>2</sup> | (9)<br>kg  | (10)<br>kg | (11)<br>kg |
| 1       | 100               | 50                 | 50                  | 0.009                 | 9                                 | 257       | 0.257                 | 2.06   | 2.30       | 0.694      |
| 2       | 125               | 62.5               | 62.5                | 0.014                 | 14                                | 322       | 0.322                 | 2.58   | 2.88       | 0.869      |
| 3       | 150               | 75                 | 75                  | 0.020                 | 20                                | 386       | 0.386                 | 3.09   | 3.45       | 1.04       |
| 4       | 200               | 100                | 100                 | 0.036                 | 36                                | 514       | 0.514                 | 4.11   | 4.59       | 1.39       |
| 5       | 250               | 125                | 125                 | 0.056                 | 56                                | 643       | 0.643                 | 5.14   | 5.74       | 1.74       |
| 6       | 300               | 150                | 150                 | 0.080                 | 80                                | 771       | 0.771                 | 6.17   | 6.89       | 2.08       |
| 7       | (350)             | 175                | 175                 | 0.109                 | 109                               | 900       | 0.900                 | 7.20   | 8.04       | 2.43       |
| 8       | 400               | 200                | 200                 | 0.143                 | 143                               | 1 029     | 1.03                  | 8.24   | 9.29       | 2.78       |
| 9       | 500               | 250                | 250                 | 0.223                 | 223                               | 1 286     | 1.29                  | 10.3   | 11.5       | 3.48       |
| 10      | 600               | 300                | 300                 | 0.321                 | 321                               | 1 543     | 1.54                  | 12.3   | 13.8       | 4.16       |
| 11      | 700               | 350                | 350                 | 0.438                 | 438                               | 1 800     | 1.80                  | 14.4   | 16.1       | 4.86       |
| 12      | 800               | 400                | 400                 | 0.571                 | 571                               | 2 057     | 2.06                  | 16.5   | 18.4       | 5.56       |
| 13      | 900               | 450                | 450                 | 0.723                 | 723                               | 2 314     | 2.31                  | 18.5   | 20.7       | 6.24       |
| 14      | 1 000             | 500                | 500                 | 0.893                 | 893                               | 2 571     | 2.57                  | 20.6   | 23.0       | 6.94       |
| 15      | 1 100             | 550                | 550                 | 1.08                  | 1 080                             | 2 828     | 2.83                  | 22.6   | 25.3       | 7.64       |
| 16      | 1 200             | 600                | 600                 | 1.29                  | 1 290                             | 3 085     | 3.09                  | 24.7   | 27.6       | 8.34       |
| 17      | (1 300)           | 650                | 650                 | 1.51                  | 1 510                             | 3 342     | 3.34                  | 26.7   | 29.8       | 9.02       |
| 18      | 1 400             | 700                | 700                 | 1.75                  | 1 750                             | 3 599     | 3.60                  | 28.8   | 32.2       | 9.72       |
| 19      | (1 500)           | 750                | 750                 | 2.01                  | 2 010                             | 3 856     | 3.86                  | 30.8   | 34.4       | 10.4       |
| 20      | 1 600             | 800                | 800                 | 2.28                  | 2 280                             | 4 113     | 4.11                  | 32.9   | 36.7       | 11.1       |

( Continued )

## APPENDIX J — Contd

| Sl. No. | Width or Diameter | Height on Parallel | Height on Curvature | Cross-Section         | Volume                            | Perimeter | Surface/Metre Length  | Weight per Millimetre Material Thickness/m Length |            |            |
|---------|-------------------|--------------------|---------------------|-----------------------|-----------------------------------|-----------|-----------------------|---|------------|------------|
|         |                   |                    |                     |                       |                                   |           |                       | Ferrous Material                                  | Copper     | Aluminium  |
| (1)     | (2)<br>mm         | (3)<br>mm          | (4)<br>mm           | (5)<br>m <sup>2</sup> | (6)<br>litres/<br>metre<br>length | (7)<br>mm | (8)<br>m <sup>2</sup> | (9)<br>kg   | (10)<br>kg | (11)<br>kg |
| 21      | 1 700             | 850                | 850                 | 2.58                  | 2 580                             | 4 370     | 4.37                  | 35.0  | 39.0       | 11.8       |
| 22      | 1 800             | 900                | 900                 | 2.89                  | 2 890                             | 4 628     | 4.63                  | 37.0  | 41.3       | 12.5       |
| 23      | 1 900             | 950                | 950                 | 3.22                  | 3 220                             | 4 885     | 4.89                  | 39.1  | 43.7       | 13.2       |
| 24      | 2 000             | 1 000              | 1 000               | 3.57                  | 3 570                             | 5 142     | 5.14                  | 41.1  | 45.9       | 13.88      |
| 25      | (2 100)           | 1 050              | 1 050               | 3.93                  | 3 930                             | 5 399     | 5.40                  | 43.2  | 48.2       | 14.6       |
| 26      | 2 200             | 1 100              | 1 100               | 4.32                  | 4 320                             | 5 656     | 5.66                  | 45.3  | 50.5       | 15.3       |
| 27      | 2 300             | 1 150              | 1 150               | 4.72                  | 4 720                             | 5 913     | 5.91                  | 47.3  | 52.8       | 16.0       |
| 28      | 2 400             | 1 200              | 1 200               | 5.14                  | 5 140                             | 6 170     | 6.17                  | 49.4  | 55.1       | 16.6       |
| 29      | 2 600             | 1 300              | 1 300               | 6.03                  | 6 030                             | 6 684     | 6.86                  | 53.4  | 59.7       | 18.0       |
| 30      | 2 800             | 1 400              | 1 400               | 7.00                  | 7 000                             | 7 198     | 7.20                  | 57.6  | 64.3       | 19.4       |
| 31      | 3 000             | 1 500              | 1 500               | 8.03                  | 8 030                             | 7 712     | 7.71                  | 61.7  | 68.9       | 20.8       |
| 32      | 3 200             | 1 600              | 1 600               | 9.14                  | 9 140                             | 8 227     | 8.23                  | 65.8  | 73.5       | 22.2       |
| 33      | (3 400)           | 1 700              | 1 700               | 10.3                  | 10 030                            | 8 741     | 8.74                  | 69.9  | 78.1       | 23.6       |
| 34      | 3 600             | 1 800              | 1 800               | 11.5                  | 11 500                            | 9 255     | 9.26                  | 74.1  | 82.6       | 25.0       |
| 35      | 3 800             | 1 900              | 1 900               | 12.8                  | 12 800                            | 9 769     | 9.77                  | 78.2  | 87.3       | 26.4       |
| 36      | 4 000             | 2 000              | 2 000               | 14.3                  | 14 300                            | 10 283    | 10.3                  | 82.4  | 92.0       | 27.8       |
| 37      | (4 250)           | 2 125              | 2 125               | 16.1                  | 16 100                            | 10 926    | 10.9                  | 87.2  | 97.3       | 29.4       |
| 38      | 4 500             | 2 250              | 2 250               | 18.0                  | 18 000                            | 11 569    | 11.6                  | 92.8  | 103        | 31.3       |
| 39      | (4 750)           | 2 375              | 2 375               | 20.1                  | 20 100                            | 12 212    | 12.2                  | 97.6  | 109        | 33.0       |
| 40      | 5 000             | 2 500              | 2 500               | 22.3                  | 22 300                            | 12 854    | 12.9                  | 103   | 115        | 34.8       |

$$\text{Cross-section} = \frac{0.8927 \times D^2}{10^6} \text{ m}^2$$

$$\text{Perimeter} = 2.5708 \times D \text{ mm}$$

$$\text{Volume per metre length} = \frac{0.8927 \times D^2}{10^3} \text{ litres}$$

$$\text{Surface/metre length} = \frac{2.5708 \times D}{10^3} \text{ m}^2$$

( Continued from page 2 )

*Members*

PROF N. R. KULLOOR

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Indian Institute of Petroleum ( CSIR ), Dehra Dun

Esso Standard and Refining Co of India Ltd,  
Bombay

The K. C. P. Ltd, Madras

Central Design and Engineering Unit ( CSIR ),  
New Delhi

# INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

## Base Units

| Quantity                  | Unit     | Symbol |
|---------------------------|----------|--------|
| Length                    | metre    | m      |
| Mass                      | kilogram | kg     |
| Time                      | second   | s      |
| Electric current          | ampere   | A      |
| Thermodynamic temperature | kelvin   | K      |
| Luminous intensity        | candela  | cd     |
| Amount of substance       | mole     | mol    |

## Supplementary Units

| Quantity    | Unit      | Symbol |
|-------------|-----------|--------|
| Plane angle | radian    | rad    |
| Solid angle | steradian | sr     |

## Derived Units

| Quantity             | Unit    | Symbol | Definition                      |
|----------------------|---------|--------|---------------------------------|
| Force                | newton  | N      | 1 N = 1 kg.m/s <sup>2</sup>     |
| Energy               | joule   | J      | 1 J = 1 N.m                     |
| Power                | watt    | W      | 1 W = 1 J/s                     |
| Flux                 | weber   | Wb     | 1 Wb = 1 V.s                    |
| Flux density         | tesla   | T      | 1 T = 1 Wb/m <sup>2</sup>       |
| Frequency            | hertz   | Hz     | 1 Hz = 1 c/s (s <sup>-1</sup> ) |
| Electric conductance | siemens | S      | 1 S = 1 A/V                     |
| Electromotive force  | volt    | V      | 1 V = 1 W/A                     |
| Pressure, stress     | pascal  | Pa     | 1 Pa = 1 N/m <sup>2</sup>       |

## INDIAN STANDARDS INSTITUTION

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| Southern : C. I. T. Campus             | MADRAS 600113                   | 41 24 42   |
| Northern : B69, Phase VII              | S.A.S. NAGAR<br>(MOHALI) 160051 | 8 78 26    |

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